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ANNUAL REPORT

OF THE

GEOLOGICAL SURVEY

OF

PENNSYLVANIA

FOR

1886.

IN FOUR PARTS.

PART I. PITTSBURGH COAL REGION.
PART II. OIL AND GAS REGION.
PART III. ANTHRACITE COAL REGION.
PART IV. MISCELLANEOUS REPORTS.

By the STATE GEOLOGIST.

PART III.

HARRISBURG:
PUBLISHED BY THE BOARD OF COMMISSIONERS
FOR THE GEOLOGICAL SURVEY.
1887.

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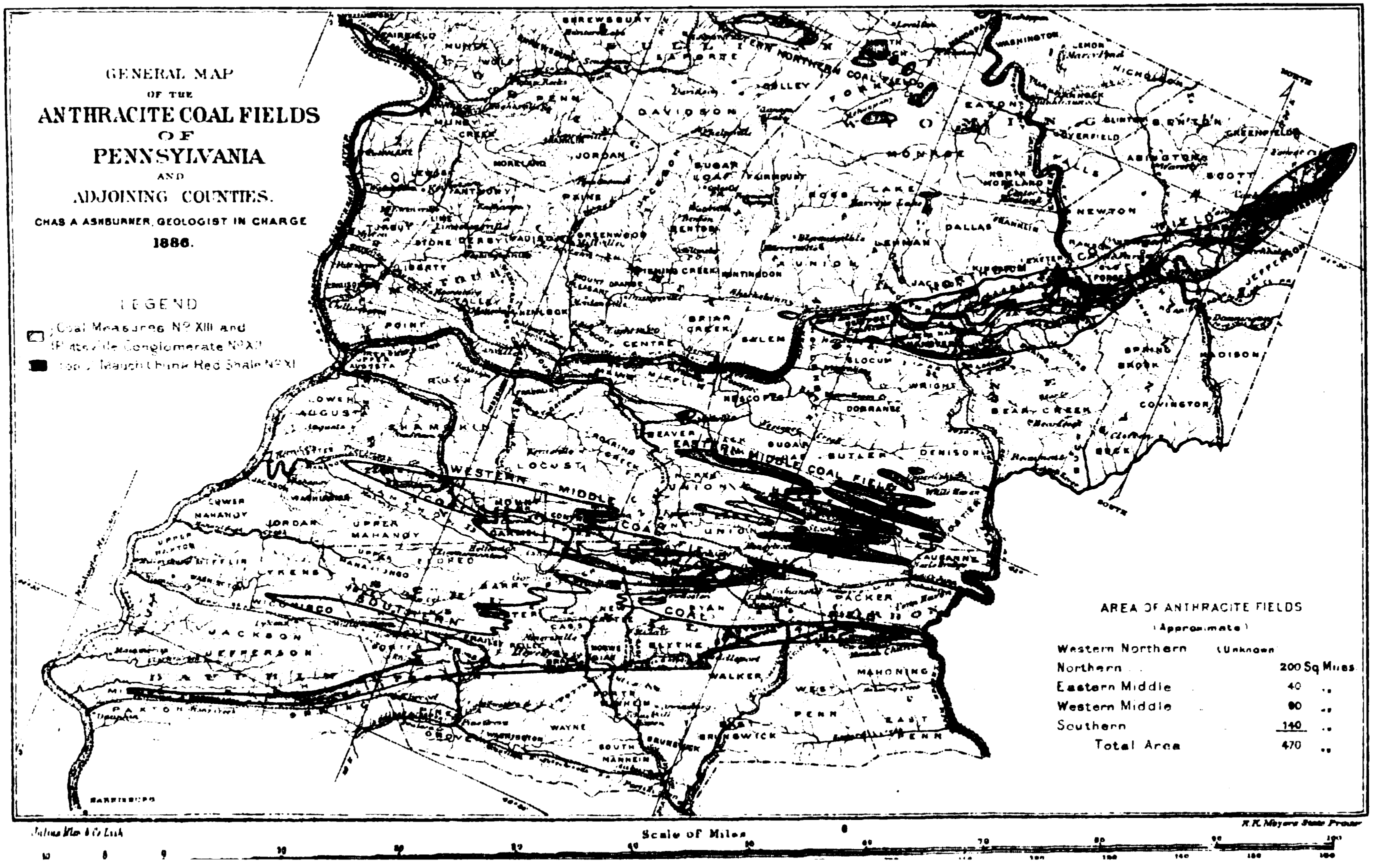

GENERAL MAP
OF THE
ANTHRACITE COAL FIELDS
OF
PENNSYLVANIA
AND
ADJOINING COUNTIES.
CHAS A ASHBURNER, GEOLOGIST IN CHARGE
1886.

LEGEND
Coal Measures Nº XIII and
Pottsville Conglomerate Nº XII
Mauch Chunk Red Shale Nº XI
AREA OF ANTHRACITE FIELDS
(Approximate)
Western Northern (Unknown)
Northern 200 Sq Miles
Eastern Middle 40 ,,
Western Middle 90 ,,
Southern 140 ,,
Total Area 470 ,,
WESTERN MIDDLE COAL FIELD
EASTERN MIDDLE COAL FIELD
NORTHERN COAL FIELD
SOUTHERN COAL FIELD
NORTH
SOUTH
HARRISBURG
Scale of Miles
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E. V. d'Invilliers, Assistant Geologist in the Pittsburgh Coal-Region and the Great Valley.

A. E. Lehman, Ass't Geologist and Topographer, South Mountain Survey

Edward B. Harden, Chief Clerk and Topographer, Baird Halberstadt, Aid, J. Adachi, Draughtsman, H. F. Albright, Clerk, M. Carraher, Messenger,	Headquarters.
Frank A. Hill, Assistant Geologist, Oliver B. Harden, Assistant, George M. Lehman, Assistant, A. D. W. Smith, Assistant,	Anthracite-Region.

SURVEY HEADQUARTERS, 907 Walnut Street, Philadelphia.

A list of the publications of the Survey is appended to this report.

ANNUAL REPORT, GEOLOGICAL SURVEY OF PENNSYLVANIA,

1886.

PART III.

REPORT ON THE

ANTHRACITE REGION.

By **Frank A. Hill.**

ILLUSTRATED WITH A FRONTISPIECE MAP OF THE COAL FIELDS;
A HELIOTYPE PAGE PLATE; AND THREE FOLDED MAPS.

WITH AN ATLAS OF SEVEN SHEETS.

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Mine Sheet No. 1 Northern coal field.
Mine Sheet No. 2 Northern coal field.
Topographical Map of a portion of the Lackawanna Valley between Scranton and Carbondale, 2 sheets.
Statistical Chart showing the Annual Production of Anthracite coal in Pennsylvania from 1820.

THIRD REPORT OF PROGRESS

IN THE

ANTHRACITE COAL REGIONS.

BY FRANK A. HILL.

CHAPTER I.

The survey of the Anthracite region was commenced as a reconnaisance by Mr. Charles A. Ashburner in August. 1880, and permanently organized by him and under his direction in July, 1881.*

The first report of progress, published in December, 1883, as volume AA, Anthracite Region, Part 1, contains a description of the plan of the survey; a general statement of the work accomplished throughout the Anthracite region; and a detailed description of the eastern end of the southern coal-field, between Mauch Chunk and Tamaqua. The second report of progress, published August, 1886, in the Annual Report for 1885, contains a brief general description of the entire region, and a detailed statement of the work accomplished by the corps from November, 1883, to January, 1886, special reference being made to the results of the survey of the Northern Coal field, between Wilkes Barre and Shickshinny.

In addition to these two reports there was published June, 1885, in pamphlet form, statistics of production and shipment of coal from the Anthracite region, for 1883 and 1884, with a general map of the Anthracite coal fields.

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* [Mr. Ashburner's plan of the Anthracite Survey was on my recommendation approved by the Board of Commissioners, and skillfully executed under his direction and personal superintendence, from 1880 to July, 1885; when it became necessary, in view of the preparation of my Summary Report on the Geology of Pennsylvania, to assign to Mr. Ashburner the executive business of the whole State Survey. Thenceforward, under the general superintendence of Mr. Ashburner, the Anthracite Surveys have been executed, without change of plan, by Mr. Frank A. Hill, who has directed personally all the details of the work of himself and his excellent associates, and has prepared this third report of progress.—J. P. L.]

Prior to January, 1887, there were published the following octavo atlases: *

(1) Atlas, Southern Anthracite Field, Part 1, containing 13 sheets relating more particularly to the Panther Creek Basin.

(2) Atlas, Western Middle Anthracite Field, Part 1, containing 11 sheets, relating to that portion of the field between Quakake Junction and Mount Carmel.

(3) Atlas, Northern Anthracite Field, Part 1, containing 13 sheets, relating to the area between Wilkes Barre and Nanticoke; and

(4) Atlas, Eastern Middle Anthracite Field, Part 1, containing 8 sheets relating to the region surrounding Hazleton and Drifton.

Report A² by Mr. Franklin Platt on the causes, kinds and amount of waste in mining anthracite, published in 1881.

Report AC and atlas on mining methods, etc., in the Anthracite Coal-field, by Dr. H. M. Chance, published in 1883.

It was the original intention to publish reports of progress to accompany each octavo atlas as it appeared, and describe in detail the geology of the district covered by the sheets in each atlas. But it soon appeared that the greatest demand of the citizens interested in the Anthracite mines was for the maps and sections which they could put to immediate practical use, and not for descriptive reports, which would be of more general interest, but of little local utility. Therefore to advance the work as rapidly as possible, the energies of the Survey corps have been almost entirely expended in field work, and in such office work as was necessary for preparing the maps and sections for publication.

Owing to the small appropriation for 1885 and 1886, the size of the corps in the Anthracite region had to be reduced; but, on account of the greater experience of the members of the corps, a larger proportionate amount of work has been accomplished during the past 18 months;

---

*The sheets contained in these four atlases have also been published in two Grand Atlases.

and a number of additional mine, geological and section sheets have been completed, which are described in that part of this report devoted to the special coal-field to which the different sheets relate.

The work of the corps, for the past year and a half, has been confined to finishing up local districts which had already been commenced; so that, while the surveys of large areas have been completed, comparatively little has been done in new areas. During the next two years, the work of the corps will be almost wholly in those parts of the region in which no work has hitherto been done.

In the second report of progress there is given a brief general description of the Anthracite Coal-fields; their geography, history, topography, structural geology, stratigraphical geology and mines. That description will suffice for public use and general reference, until the map work of the entire region has been completed, when it will be again described in greater detail.

Since the publication of the Annual Report for 1885 several maps have been completed and the work on others materially advanced.

The maps which have been completed are as follows:—

A General Map of the Anthracite Coal-fields of Pennsylvania and adjoining counties.

This map shows the position of each colliery and is constructed on a polyconic projection based upon the triangulation determinations of the United States Coast and Geodetic Survey. These locations are so few and scattered that the positions of many prominent points on the map are not geodetically known. The details of the map have been compiled from the surveys of the Geological Survey and of the mining and railroad companies. These surveys are confined almost exclusively to the coal basins outside of which the map has been compiled from railroad surveys and county maps. Although the map may be found by subsequent surveys to be incorrect in many of the details within these latter areas, yet it is the most reliable which can be published at this time. The Geological Survey propose to publish a new and revised map, embracing the anthracite and adjoining areas when its surveys and those of the United States Coast and Geodetic Survey are completed.

This map has been published to meet a want which has long been felt by the several branches of the coal trade and to meet a demand which has been frequently made upon the Geological Survey.

It will be followed by a future publication on which will be shown the position and extent of the several formations below the coal measures in the geological column.

The Lackawanna Topographical Map.

Progress on this map was stopped by the decision of the Legislature at the session of 1885 not to appropriate money for topographical work. The base lines have been completed through the entire area of the field north-east of Scranton and many additional lines surveyed which do not appear on the published sheets (see atlas to this report). These lines are not published be cause they do not complete the topography of any special area. It was the original intention to hold this map until its surveys covered the entire Lackawanna valley north-east of Scranton. It is purposed to publish ultimately a series of sheets (800′=1″) of which this survey will be the base, containing in addition to the contour curves of the surface and the land lines, mine workings and data relating to the geological structure of the coal beds.

This unfinished map is now published to meet an urgent demand for the special information which it contains.

Northern Coal-field Mine sheets Nos. I and II.

The completion of these sheets now gives a continuous mapped area from the extreme western end of the Northern coal field to the town of Mill Creek, four miles east of Wilkes Barre. A detailed description of these sheets will be found in Chapter II.

In addition to these maps which have been completed, there are other mine sheets, cross and columnar sections which are nearly ready for publication. The mine sheets, ur in number, are all in the Northern coal field in the cinity of Pittston, Luzerne county. They extend as far st as Spring Brook. It is only necessary to extend the lliery workings of the operating companies to their presnt boundaries, in order to place these sheets in the hands the State Printer. In the Northern field we have three nfinished cross sections which extend from the outcrop the Pottsville Conglomerate, No. XII on the north side the basin, to the same outcrop on the south side, and veral other sections which show the position of the coal ds at individual collieries. We have also sixty columnar ctions of the measures cut in shafts, tunnels and bore oles.

Western Middle Coal-field Mine sheets Nos. V, VI, VII and VIII.

The completion of these mine sheets finishes the maping of the entire area of the Western Middle field with he exception of a small portion which extends north eyond the boundaries of the sheets. A description of hese sheets will be found in Chapter III.

In the Western Middle coal field we have six cross secions which will soon be completed and one hundred and venty columnar sections which only await arrangement on heets to make them ready for printing.

The necessary work for the completion of these maps, he field and office work on coal statistics (Chapter VII) nd the other material contained in the maps and text of his Annual Report for 1886, together with other work in rious directions have occupied the anthracite corps during the past year.

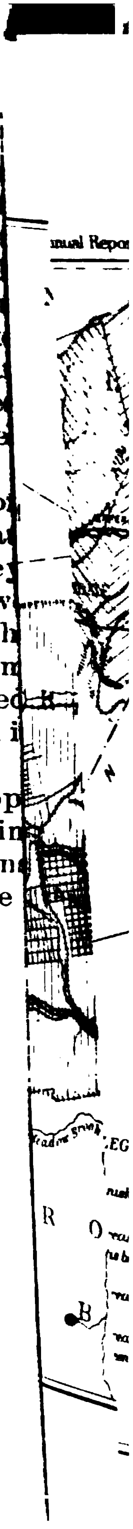
In the Southern field there has been no field work done during the past year, (beyond the collection of data, which would otherwise have been lost) although its importance has been fully appreciated, in view of the great thickness of coal measures in its deeper parts, and because its area is second only in extent to that of the northern field.

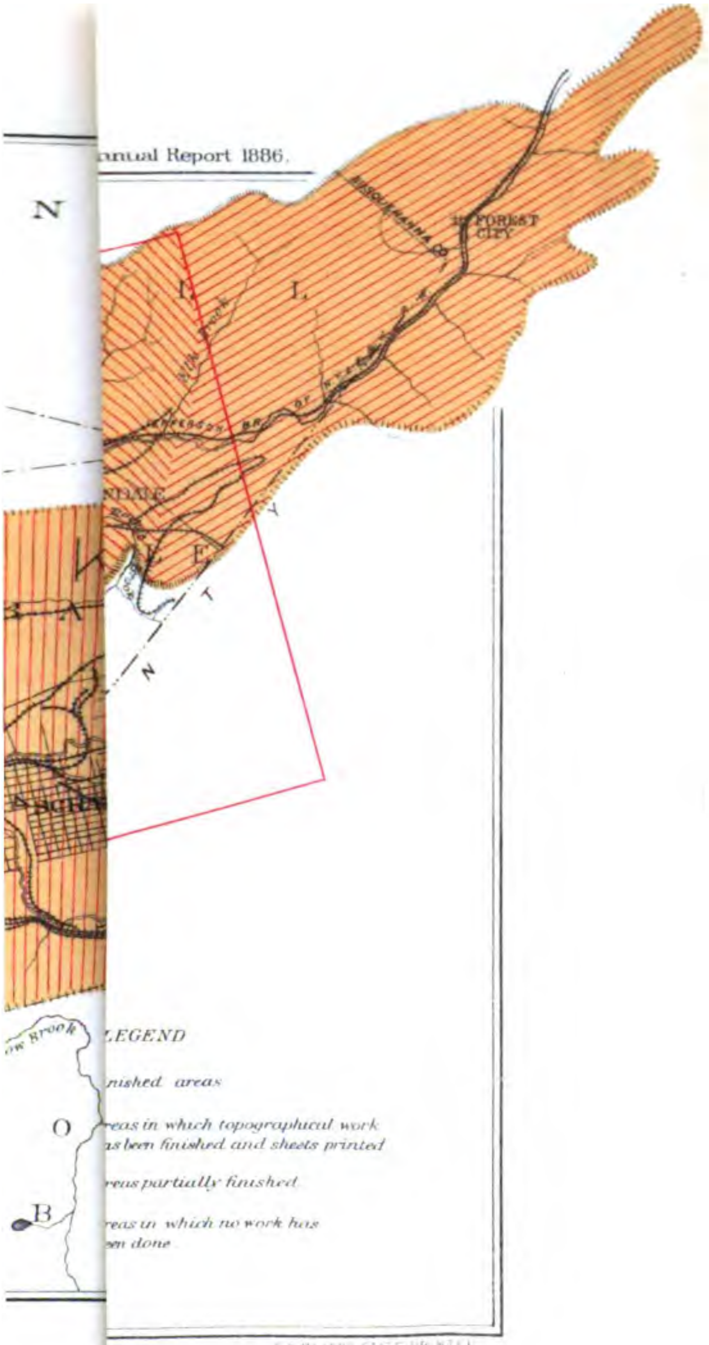
The only series of maps which have been completed in

this field, are those of its eastern end extending fro
qua to Mauch Chunk, published in the repor
Panther Creek valley. In default of sufficien
priations. the survey of the Pottsville basin from
westward was suspended. Now, however, the co
of the Western Middle Coal-field mine sheets mak
sible to resume work in the Southern coal field, a
plete its survey. Many of the original collieri
field have been abandoned; most of its early deve
was done by individual operators; so that a large
its mining records are scattered through various o
held by private persons. These will be collected a
in connection with the new field work of the surve

In the Eastern Middle or Lehigh coal field, no w
been done during the past year. The two mine s
ready published, cover the ground of some of the
portant collieries, but a large area is still untouche
probable that the whole field will be surveyed and i
sheets published in the next two years.

The Bernice basin of Sullivan county was mapp
described in the Annual Report for 1885. It remai
fine the limit of the adjoining Mehoopany basin
same field. This work will be facilitated by the
recent railroad surveys.

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CHAPTER II.

Survey of the Northern Coal field.

The survey of the Wyoming or Northern Coal-field by the eological Survey corps was begun in the latter part of 81. In May, 1885, the Northern Coal-field Atlas, Part was published. This atlas was described in the Annual eport for 1885, and in addition to other material, contain- l Mine sheets Nos. III to VIII, inclusive. These sheets ver areas in Luzerne county, which extend north and uth, just beyond the limits of the coal field and from the own of Wanamie, in Newport township, Luzerne county, ast to the town of Mill Creek, in Plains township, the eastern oundary of Sheet VIII being four miles east of the city of Vilkes Barre.

Mine sheets I and II include within their boundaries the ntire width of the coal field and all of its length, west of Vanamie. The eastern edge of Sheet II, is the western dge of Sheet III. The mapped area on these sheets is ounded in a general way, by the outcrop of the bottom f the Pottsville Conglomerate, No. XII.

Mine sheet No. I is the most western of the Northern oal field sheets. It extends west of Shickshinny, about ½ miles, far enough to include the extreme western end of he Wyoming or Northern basin. Its eastern line is 5,500 eet north-east of the West End No. I breaker, and crosses he basin nearly at a right angle to the course of its axial ine. It embraces within its borders the towns of Shick-hinny and Mocanaqua, but outside of these towns its areas re almost uninhabited.

Mine sheet No. II adjoins sheet No. I, and extends east to Wanamie, including the western portion of that town and also the newly-built village of Glen Lyon within its borders.

When in 1881, the survey of the Northern coal field was begun it was intended to publish Mine sheets Nos. I and II with the other sheets in Part I of the Atlas. A little field work, however, showed the geological difficulties of the area and the desirability of an accurate topographical map as an aid to its development. The Susquehanna Coal Co. through its Chief Engineer, Mr. J. H. Bowden, was at this time commencing work on an accurate and valuable map of that company's property, which has since been finished and placed in the hands of the Geological Survey.

Mining developments were also being made by the West End and Susquehanna Coal Companies, which have since thrown much light on the economic value of their respective properties. These two properties cover the greater portion of both sheets. It was therefore considered best to postpone the survey of these sheets until developments were further advanced, while the Susquehanna Coal Co.'s map was at the same time approaching completion.

After a reconnaisance of several days, on July 1, 1884. the work was begun. The advantage of a topographical map in connection with the study of the geology of this region was at this time even more fully appreciated than before. The Susquehanna Coal Co.'s map and the equally accurate survey of the property of the West End Coal Co. by Mr. Irving A. Stearns, the company's mining engineer, and Mr. H. S. Reets, his successor, were placed in the hands of the Survey and used in connection with the Survey's work in the construction of the present sheets.

The placing of underground workings and the surface contour lines on the same map area has never before been accomplished by the Anthracite Survey over so extended an area. The mine workings on sheets Nos. I and II being comparatively simple, it has been possible to show both these features with little confusion.

Such a showing is very essential in the construction of all colliery maps and its only obstacle should be the confusion arising from the complication of mine workings in several beds underlying each other on the area mapped.

The practical benefits accruing from an accurate map of this kind in development as well as in progressive mining can be readily appreciated.

The fact that these sheets, are, in this particular, representative of their class may make a brief mention of the method of their construction of interest and value.

The connecting of the map made by the Susquehanna Coal Company covering that portion of Sheets I and II between Wanamie on the east, and the Dupont and Hassleman drifts of the West End Coal Company on the west; the West End Coal Company's map, reaching from the Hassleman drift to Mocanaqua; and a vernier survey crossing the Susquehanna river and connecting with points on the Salem Coal Company's map, thus joining the West End and Salem Coal Company's properties, made a rigid base to which all the other survey lines were connected. There are 590 points on the two sheets where the survey lines were tied.

The most marked topographical features on these sheets are the mountain slope of the Susquehanna river along their northern borders, and the gap at Mocanaqua made by the river in its sweep to the south, but the many rocky cliffs and spurs, with their attendant hollows, give a variety of contour, which, taken in connection with the study of the coal beds and their intermediate rocks, is of special importance in the location of the outcrops and general geological features.

A glance at the contour curves, which are ten feet vertically apart, will show the abruptness and irregularity of the topography. The rough and broken character of the surface, together with the predominance of the thickly wooded areas, necessitated an amount of detailed work unusual in the construction of maps of this character. The number of stations and length of the lines run per square mile, as shown in the table on page 928, fully illustrates this point.

No section lines at regular intervals were run, but lines along the crests of the hills and bottoms of the hollows, were first established and from these all necessary side lines were extended. Every line was measured by stadia, the rough and wooded character of the country making this method by far the most economical.

One transitman with one, and sometimes two rodmen, worked over a definite area, while a similar party worked over an adjoining area. These working areas were so selected that each transitman checked not only his own work, but the work of his associate. Mr. Arthur Winslow's stadia tables were used in the calculation of horizontal distances and elevations. In the progress of the topographical work the character and dip of the rock exposures were accurately noted.

The following statement will give an approximate idea of the detail necessary in the completion of this work :

Total length of line in feet	1,507,024
Total length of line in miles	285.5
Total number of stations	5,711
Total number of square miles contoured	13.02
Average length of line per square mile in miles	21.9
Average number of stations per square mile	438.6
Average length of sight in feet	264.0
Average number of stations per day	36.5
Average length of line per day in feet	9,622
Average number of men employed per day	5
Swamp area in acres	115

After the completion of the topographical field work the mine workings were located on the topographical sheets, being connected by survey points common to both. In this location the mine maps of the Susquehanna, Lehigh and Wilkes Barre, West End and Salem Coal Companies were used, and upon them much of the value of the sheets depends.

Drainage.

The areas embraced by these two sheets are drained by the waters of three distinct creeks and their tributaries. They are: Newport creek, Black creek, and Paddy run. All empty into the North Branch of the Susquehanna river. Of these Newport creek drains the largest area, including almost the entire surface of Sheet No. II. Its drainage system is separated from that of Black creek, by a well-marked water shed, which at its lowest point, is 950 feet above tide, and about 440 feet above the level of the river at Shickshinny. The north branch of

Newport creek is the one of greatest importance. Its source is near the extreme north-western corner of the Susquehanna Coal Company's property, and about 1,600 feet from the line between Conyngham and Newport townships. Its general course is north 70° east. Its waters on Sheet II are fed by those of the middle branch of Newport creek, which, rising in Conyngham township, about 300 feet west of the Newport line, flows through the swamp near the Uplinger and Miller farms, and joins the North Branch near the eastern edge of the sheet. In addition to this it receives the waters of two creeks of minor importance from the north slope of the valley, and of one other on its south slope. The south branch of Newport creek, which heads in the swamps near Mackey's clearing, a mile and three-quarters west of Wanamie, flows east through that town and joins the main Newport creek on Sheet III, in the vicinity of Nanticoke.

There is no portion of Mine sheet No. I drained by the branches of Newport creek. It is located entirely on the south-west side of the water shed. As far west as the river, Sheet No. I is drained by the waters of Black creek, which rises in the swamp of that name and flows west, then south-west across the West End Coal Company's property in Conyngham township, and empties into the river a few hundred feet south of the town of Mocanaqua. It has but two tributaries and these are of but minor importance; one is the creek which rises about half a mile east of the Dupont drift and which flows into Black creek just north of the Golden drift. The other, Turkey Pond creek, is at times almost dry, but during the Spring rains is a stream of some volume. Some 2,000 feet above its mouth Black creek falls over a high ledge of Pottsville Conglomerate, producing an effect especially interesting in the study of creek erosion.

Paddy run drains the high mountain areas of the Salem basins, and flowing from the west rapidly descends the eastern face of Rocky Mountain and empties its waters into the Pennsylvania canal at the breaker of the Salem Coal Company below Shickshinny. All these streams have gathered more or less drift, but the rapid fall of Paddy run and Black creek have prevented them from depositing it in quantity along their courses. The main Newport creek, however, with a less rapid flow in a broader valley, has, together with the glacial ice, deposited drift along its course in such quantities that mining beneath it will always have to be preceded by exploration of the drift's depth, before absolute safety can be assured. Similar deposits of drift, but in smaller quantity, are seen along the south branch of Newport creek. The Alden shaft near its southern bank, on Mine sheet No. III, was with difficulty sunk through 68 feet of wash, while in the workings of the Ross Slope, at Wanamie, the south branch of Newport creek was undermined, causing, in 1874, a rush of quicksand into the workings which emphasized in a marked degree the dangers of mining under the drift deposits along these creeks.

The scene of the terrible disaster at Nanticoke of December 18th, 1885, is on Mine sheet No. III, near the banks of Newport creek, and the Buried valley (which is so carefully guarded against by the many borings, made in advance of the workings of the Susquehanna Coal Co.s collieries,) extends west across the line of Sheet II though gradually growing more shallow to the west.*

In this connection the sink holes in the neighborhood of the Uplinger and Miller farms, near the west line of Newport township, are worthy of study. These holes (which are shown on the map) are from 15′ to 25′ deep, their bottoms and sides being covered with the surface wash from the neighboring fields. How deep the original hole may have been exploration alone will determine. Their presence in a region bearing so plainly the marks of glacial erosion and deposition indicates their origin, while the fact that even after the most violent storms, water immediately drains from them suggests a depth to bed rock which demands precaution and care in the extension of the mine workings beneath them.

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*In the Annual Report of the Geological Survey for 1885, pages 627 to 636, Mr. Charles A. Ashburner describes the Buried valley of Newport creek with special reference to the mine accident of December 18th, 1885.

Glacial striæ are found in all portions of these sheets and at all elevations. Their courses differ in direction from south 30 east, to due west. Large pieces of Mauch Chunk red shale are found lying loosely on rocks whose geological position is at least 500′ higher than that of the red shale itself. Fragments of this same rock are found on the very highest elevations on the sheet, which are at least 900′ above the Susquehanna River level. Large boulders of Pottsville Conglomerate have also been moved by the ice and deposited at various distances from their original location.

Railroads.

There are three separate systems represented in the railroads on the sheets. The North and West Branch Division of the Pennsylvania Railroad carries the coal from the West End Breaker No. 1, and also that which it receives at Nanticoke via the Glen Lyon branch from Colliery No. 6 of the Susquehanna Coal Company. The Lackawanna and Bloomsburg Division of the Delaware, Lackawanna and Western railroad receives the Salem Breaker coal, while the coal from the West End Breaker No. 2, and that from Wanamie No. 19, is sent to market over the Lehigh and Susquehanna Division of the Central Railroad of New Jersey.

Each of these railroads have grades most favorable to the direction of their special trade. And under the existing relationship between the operating and carrying companies their locations are especially desirable.

Geology.

The parting between the Mauch Chunk red shale, No. XI, and the Pottsville Conglomerate, No. XII, is clearly defined at all points on the sheets. The Susquehanna, along the north side of the basin, has cut its way down through 600 feet of the rocks of No. XI, dipping 25°± to the south, leaving the massive rocks of No. XII to cap the mountain top. From the eastern edge of Mine sheet II the river continues its western course to Shickshinny where, swinging to the south, it cuts the coal basin at right angles to its course and exposes the coal measures, conglomerate and red shale in the gap.

On the south side of the basin between Wanamie and Mocanaqua the dip of the conglomerate is vertical or nearly so along its entire length. These abrupt dips make strongly marked bluffs towering above the eroded red shale valley to the south.

West of Shickshinny and the Susquehanna river the conglomerate-red shale parting is equally well marked, though the red shale outcrop is exposed in a gently dipping mountain slope, instead of steep water cut cliffs as it is to the east. Here, along the summit of the Rocky mountain lie the Salem coal basins a continuation of the main Wyoming basin, but separated from it by the river in its course to the south. The conglomerate outcrop in these basins is plainly seen in the mountain slopes on the north, south and east, while the western end of the conglomerate forms a mountain crest which overlooks the red shale valley beyond.

The horizon locally recognized as the Pottsville Conglomerate, No. XII is that contained between the bottom of the B, Buck Mountain or Red Ash bed and the top of the Mauch Chunk red shale, No. XI. Its thickness on sheets I and II varies from 60 feet in the Salem basins to 140 feet at the Dupont drift. Its average thickness is 110 feet.

About the middle of No. XII, some 60 feet geologically lower than the B bed, on sheets I and II, the A bed is found. While this bed is developed at scattered points through the Northern field it is on Sheet No. I that it reaches its maximum thickness.

Along the south outcrop of the Salem Coal Co.'s counter basin a number of trial shafts have been sunk on the outcrop of this bed. It is also cut in the Mountain tunnel near the west line of the Salem Coal Co's property..

There is a marked thinning of the conglomerate between the south and north sides of the basin, the north side conglomerate with its reduced thickness showing no exposure of the "A" bed.

On the east side of the river in Rope Drill bore hole No.

1, (near Breaker No. 2) of the West End Coal Company, a bed 1′8″ thick was cut about 90 feet under the Red Ash bed. In Bore hole No. 2 (900 feet west of the Hassleman drift) what appears to be the same A bed was also cut. At a point north of Black creek and 1700 feet S. 60′ E. from the Dupont drift an opening has also been made on what I believe to be the same bed. The opinion is held by some of the parties interested in the properties in this vicinity, that this shafting is on the outcrop of the Red Ash bed. If this latter opinion is correct, it materially increases the value not only of the property in the immediate vicinity, but brings the possibility of finding the Red Ash bed. in the areas separating the several basins, within the limit of probability.

Although the A bed is at no point in the Northern Coal-field considered workable, its occurrence is of geological interest and importance from its probable indentity with one of the (Lykens Valley) coal-beds of the Bernice and Mehoopany basins as well as of the more Southern Anthracite fields.

While the bottom of No. XII is so clearly defined, the outcrop of the B, Buck Mountain or Red Ash bed which marks its top, is in many places so obscure, as to render an absolute conclusion as to its position impossible. The Red Ash being the lowest workable bed, the location of its outcrop outlining the coal area which it underlies, is a matter of great economical importance; while at the same time it defines a prominent geological horizon.

The colliery workings of the Salem basins develop the B bed to such an extent that the location of its outcrop within this area is an established fact.

East of the Susquehanna on the extreme north and extreme south edges of the coal basin, protected by the outcropping conglomerate, the erosion of this coal-bed is simple and its outcrop is preserved; but in the secondary rolls between them, the erosion is so complex that much of the location of this outcrop is theoretical.

As the outcrop of the Red Ash bed defines the limits of the workable coal-beds, its location will necessarily be included in a description of each of the several local basins.

Anticlinals.

The rise and fall of the anticlinals along their axial lines, and the degree of the dips on either side have such a material effect, not only in shaping the outcrops of the several coal-beds, but in determining questions of economical mining, that a brief description of several of the most important may be of value.

Wanamie Quarry anticlinal.

The Wanamie Quarry anticlinal gets its name from its fine exposure in the Ross bed quarry at Colliery No. 19.

The workings in the Baltimore and Ross beds at this colliery outcrop on both sides of this anticlinal, while the Red Ash bed, geologically lower, arches over it before coming to the surface. There can of course be no better determination of the position and dips of an anticlinal than actual mine developments, so that at this point the character of this anticlinal needs no special description.

As we continue west along the axis a north dip of 45° and a south dip of 26° are observed at the eastern edge of the swamp north of Mackeys' clearing. From here west to the West End breaker No. 2, the anticlinal runs through successive swamps, and the rock exposures along its immediate course are consequently few. West of the breaker along the mountain slope the anticlinal is plainly seen, the south dips varying from 5° to 54°, but with an average of about 40°, and the north dips from 4° to 59° averaging about 35°. This anticlinal affects the plan of mining development in this locality separating as it does the Priscilla Lee basin No. 1 from the Newport basin, and the Priscilla Lee basin No. 2 from the Black Creek basin.

A glance at the map will show that while the Red Ash bed outcrops over this anticlinal some 3600′ east of the Wést End No. 2 colliery, and from there west the outcrops on either side are separated by irregular barren areas, yet south of the Black Creek tunnel on the mountain crest the peculiar effect of the erosion is such that the opposite dips of the Red Ash bed again almost meet on the summit of the anticlinal.

Along this axis near the eastern end of the Priscilla Lee basin No. 2, a number of attendant local axes are shown. While these axes will have some effect upon mining developments, they are entirely local, and have no effect on the general geology of the district.

Mocanaqua-Warrior Run anticlinal.

This anticlinal on Mine sheets III and IV, has already been described in the Annual Report for 1885. On sheet II, while it does not bring the outcrop of the Red Ash bed to day, east of the Teasdale opening, its steep dips will have a very marked effect in shaping the course of future gangways driven in the Newport basin.

At the Halfpenny Barn tunnel at Wanamie, it is attended by a secondary roll through which the tunnel has been driven. This tunnel was driven in confused dips, and any certain identification of the beds or explanation of their relationship to the elevation of this anticlinal, is impossible. Near the Teasdale opening the steep north dips of this anticlinal, form what is locally known as the "Hogback." It is on these north dips that the slope of the West End Coal Company was started, and afterward suspended. West of the Teasdale opening the Pottsville Conglomerate is exposed along the axis of this anticlinal, but with much flatter dips. Just east of the railroad leading to the Golden drift, all trace of the anticlinal is finally lost in the steep dips of the "High rocks."

The third and last of the more important anticlinals is the Newport Centre anticlinal No. I, (the eastern portion of which has already been described in the Annual Report for 1885.) It is clearly shown by surface dips throughout its entire length, and has also been developed by the tunnel workings at Colliery No. 6, Susquehanna Coal Company at Glen Lyon. Its dips are sharp and well defined, and with the accompanying topography leaves no doubt as to its location.

In addition to the three more prominent anticlinals east of the river, there are the Sand Drift anticlinal in the Black Creek basin ; and the Teasdale fault and Dupont Drift anticlinals in the Newport basin, (which have already had a marked effect on the shape of the mine workings of the West End collieries) and the Newport Centre No. 3 anticlinal, in the Newport basin, which is as yet unapproached by mine workings. In addition to these there are numerous anticlinal rolls of local interest.

West of the river, on the Salem side, there are two prominent anticlinals. The most plainly marked is the Salem anticlinal, which forms the northern boundary of the Counter basin. Its south dips will average about 28°, while those on the north vary from 15° to 50°. Towards its extreme western end this anticlinal flattens very rapidly before dying entirely away on the mountain side.

The Paddy Run anticlinal marks the southern boundary of the Crary-Paddy Run basin. It is shown by continuous dips in the hillside, and makes a sharp indentation in the red shale and conglomerate along the mountain top.

Basins.

The separate basins east of the Susquehanna, on the two sheets are the Newport, Black Creek, the Priscilla Lee No. 1, and Priscilla Lee No. 2. All of which are on the south and east side of the river. The basins on the northwest side of the river are collectively known as the Salem basins. They are the Counter, Beadle, No. 4, Spike Island and the Crary-Paddy Run basins.

Newport basin.

The largest and most important of these is the Newport basin, which, rising from under the river flats at Nanticoke, has its western limit at the Dupont drift of the West End Coal Co. This basin is a continuation of the most important one of the Northern coal field, including as it does, not only the extensive collieries in the vicinity of Nanticoke, Wilkes Barre and further east, but also on Mine sheets Nos. III and IV, the undeveloped areas of the deepest portion of the Wyoming or Northern Coal-field.

The principal development of this basin on sheets I and II is in the No. 6 shaft and tunnel of the Susquehanna Coal Co., the Hasselman (Colliery No. 2), and Dupont (Colliery No. 1), drifts of the West End Coal Co., and the Wanamie No. 19 colliery workings of the Lehigh and Wilkes Barre Coal Co. Just east of Mine sheet No. II, on Sheet No. III, are the extensive workings of the Susquehanna Coal Co., at Nanticoke. These workings have now so thoroughly developed the coal beds in this locality, that the conditions and characteristics of the coal measures in the immediate vicinity are very thoroughly understood. The basins and saddles which these workings develop together with those further to the south continue west on Sheets II and I.

At the No. 1 shaft, of the Susquehanna Coal Co., west of Nanticoke, (on Mine sheet No. III), the Red Ash bed is cut at an elevation of 400 feet below tide. The outcrop of this bed at the Dupont drift, which is at the extreme western limit of the Newport basin, is 750 feet above tide. The rise from Shaft No. 1 towards the west is therefore 1,150 feet in a distance of about 6 miles. In the No. 1 shaft 9 workable beds are cut, the highest being 473 feet above tide. These beds therefore outcrop between No. 1 shaft and Dupont drift. It will be observed, however, that the Dupont drift is not in the same local basin as the No. 1 shaft, but develops a basin more to the south. The basin in which Shaft No. 1 was sunk dies away in its rise to the west along the mountain slope north-east of the Dupont drift.

The best development of the coal measures on sheets Nos. I and II are those at the Susquehanna Coal Company's No. 6 colliery at Glen Lyon. The shaft which is 749 feet deep, cuts 7 workable coal beds, all of which must outcrop on sheet II, between No. 6 shaft and the Dupont drift.

There are no bore holes (other than those used for testing the depth of the surface wash), or other trial holes on the sheets within the limits of this basin.

The outcrops, however, of the several coal beds have been proven in many places on the properties of the different companies.

Probably the most profitable bed mined on the area covered by these sheets is the Red Ash, the location of the outcrop of that portion bounding the Newport basin is herein described.

The shaft and tunnel at the No. 6 colliery have extensive workings in the beds which are cut by them. The following sections taken at various places in the workings will show the character of the coals mined.

Section of Ross bed taken in East gangway of tunnel workings 350 feet from tunnel:

Top sandstone.	
Coal,	.6''
Slate,	.5''
Coal,	.6''
Slate,	.4''
Coal,	.10''
Total,	410'' 9''

The workings of the Wanamie No. 19 Colliery develop an anticlinal and basin, the latter of which continues west to the end of the Wilkes Barre mountain. This basin is known as the Priscilla Lee and while it is really a southern

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The accompanying heliotype plate represents the modeled surface of the western end of the Northern Anthracite coal field, made by Mr. George M. Lehman, of the Survey, from Mine sheets Nos. 1 and 2; each contour line being cut out of cardboard, $\frac{1}{16}$ of an inch thick, to represent 20 feet of vertical height. The vertical and horizontal scales being the same [800': 1''] there is no distortion. A heavy line, following the outcrop of the Red Ash [Buck Mountain] coal bed, marks the productive coal areas, seven in number; four of them on the western side of the river. The dotted line represents the contact of the Mauch Chunk red shale with the bottom of the Pottsville conglomerate. The steep dips along the southern edge of the field brings these two lines closer together than along the northern edge. The highest elevation of the northern outcrop of conglomerate is 1420 A. T.; at the western end of the Salem basin 1350 A. T. or 840' above the river. The slope to the river is everywhere along this ridge about 45°. In five miles the river surface level only falls ten feet.

This model brings out strongly to view the sigmoid water-shed between Mocanaqua and Wanamie, the highest point of which is 1140' A. T.; the lowest 910' A. T. or 410 feet above river level at Mocanaqua; Newport creek waters draining east, and Black creek waters west from it.

The large arrows on the model indicate the direction of the glacial scratches observed by Professor Branner; and others observed by Mr. Lehman, along the North and West Branch railroad, on red shale exposures at the base of the hill, parallel with the river; showing that the last ice flowed down the river bed westward.

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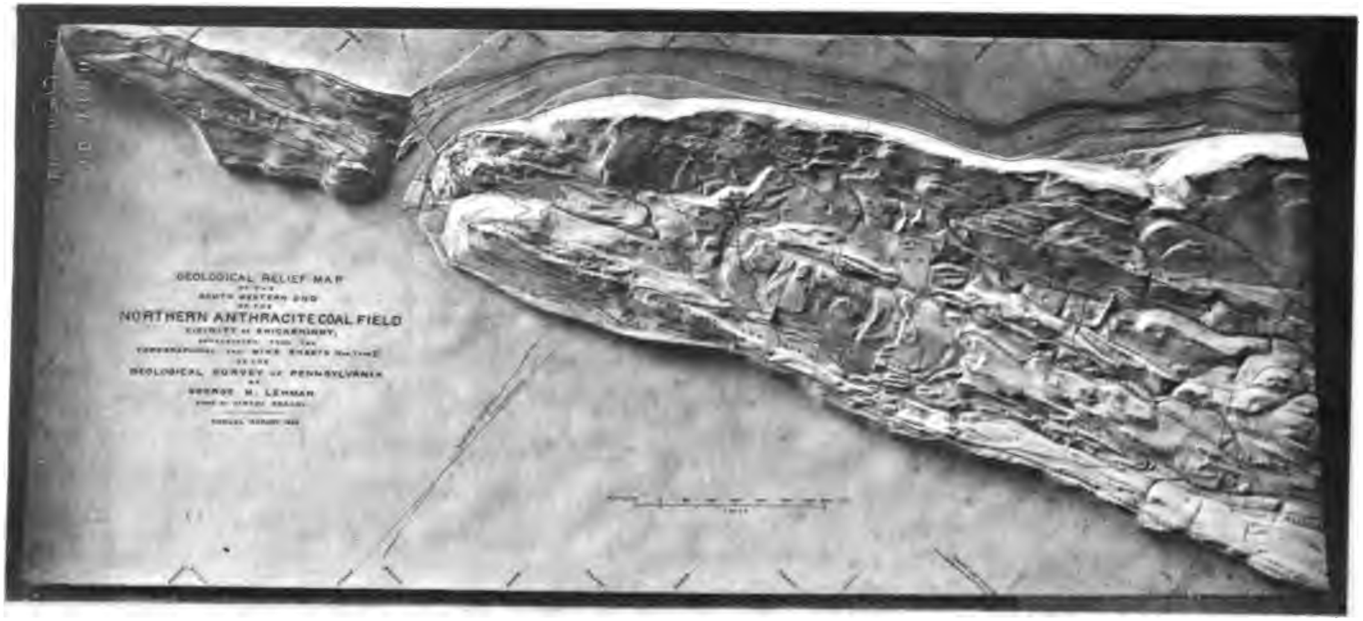
GEOLOGICAL RELIEF MAP
OF THE
SOUTH WESTERN END
OF THE
NORTHERN ANTHRACITE COAL FIELD
VICINITY OF SHICKSHINNY,
TOPOGRAPHICAL AND MINE SHEETS
OF THE
GEOLOGICAL SURVEY OF PENNSYLVANIA
BY
GEORGE M. LEHMAN

spur of the Newport basin it is generally considered as a separate one, and shall be so spoken of here.

Beginning at the eastern edge of Sheet No. II near its south-eastern corner we can readily trace the Red Ash outcrop towards the west, along the south side of this basin. Along the north side of the Priscilla Lee basin No. 1 and separating it from the Newport basin is the Wanamie Quarry anticlinal. In the vicinity of Wanamie we find that the north dips of the Red Ash bed in the Newport basin proper do not rise to the surface, but turn over the Wanamie Quarry anticlinal into the Priscilla Lee No. 1 basin, just mentioned. The Red Ash bed arches over this anticlinal below the surface until it reaches the vicinity of the West End Colliery No. 2, where the erosion which has exposed the rocks of No. XII along the anticlinal has also stripped the overlying outcrop of the Red Ash bed. West from this point the anticlinal in the Conglomerate, rises along the mountain side, the Red Ash along its southern dips forming the north outcrop of the Priscilla Lee No. 1 basin, while on its north side following it to the west we find the outcrop shown in the Hassleman, James, and Teasdale openings under the high cliffs which are seen north and east of Black Creek and the Turkey pond.

Leaving the Teasdale opening we can still follow the outcrop to the west by the topography between this opening and the Turkey pond creek and by the exposure of No. XII in this locality. Continuing west of Turkey pond creek between it and the Dupont drift, (while there is no shafting on the outcrop) the rock exposures would indicate the position of the Red Ash bed as shown on the sheets.

After reaching the Dupont drift (the workings of which on this bed are very extensive) the crop is shown irregularly eroded along the hillside reaching north towards the crest of the river mountain. Continuing east along the mountain, the outcrop can be traced by the existing topography to the eastern line of the West End Coal Company's property. At or near this point the bed seems to separate forming two distinct splits, and these two splits are developed in continuous shaftings across the property of the Susquehanna Coal Company as far east as the wagon road, crossing the river mountain, from the County Poor house into the valley of Newport creek. From here east to the sheet line, though broken by anticlinal rolls, the outcrop is partially indicated by occasional exposures in the creek beds, but on the north-eastern side of the Newport Creek anticlinal No. 3 its location is very uncertain.

At Nanticoke as well as at other points through the Wyoming basin, these two splits of the bottom bed occur.

The existence of a bed beneath the one known as the Red Ash at the mouth of the Dupont drift is proven improbable by the Diamond drill bore hole which was bored at the drift mouth from the bottom of the Red Ash bed into the red shale, a distance of 192′ without encountering the slightest evidence of coal. The following section shows the thickness and character of the rocks encountered in this hole.

Section of Diamond Drill bore hole No. 1 at the mouth of the Dupont drift of the West End Coal Company, in the Newport basin.

No. of Strata.	Description,	Thicknesses measured vertically.	Distances perpendicular to dip.
1	Blue rock,	2′ 0″ to 2′ 0″	1′ 11″ to 1′ 11″
2	Soft sandstone,	4′ 0″ to 6′ 0″	3′ 11″ to 5′ 10″
3	Gray sandstone,	2′ 2″ to 8′ 2″	2′ 0″ to 7′ 10″
4	Dark sandstone,	5′ 7″ to 13′ 9″	5′ 5″ to 13′ 3″
5	Gray sandstone,	10′ 10″ to 24′ 7″	10′ 5″ to 23′ 8″
6	Slate,	9″ to 25′ 4″	9″ to 24′ 5″
7	Firm gray sandstone,	7′ 3″ to 32′ 7″	7′ 0″ to 31′ 5″
8	Dark gray sandstone,	3′ 10″ to 36′ 5″	3′ 8″ to 35′ 1″
9	Conglomerate,	3′ 9″ to 40′ 2″	3′ 7″ to 38′ 8″
10	Red streak,	1″ to 40′ 3″	1″ to 38′ 9″
11	Dark gray sandstone,	8′ 7″ to 48′ 10″	8′ 4″ to 47′ 1″
12	Conglomerate,	23′ 0″ to 71′ 10″	22′ 2″ to 69′ 3″
13	Dark sandstone,	13′ 4″ to 85′ 2″	12′ 10″ to 82′ 1″
14	Conglomerate,	5′ 8″ to 90′ 10″	5′ 6″ to 87′ 7″
15	Slate and sandstone,	3 0″ to 93′ 10″	2′ 11″ to 90′ 6″
16	Conglomerate,	11′ 11¼″ to 105′ 9¼″	11′ 7″ to 102′ 1″
17	Sandy slate,	1′ 0″ to 106′ 9¼″	1′ 0″ to 103′ 1″
18	Blue rock,	6′ 9″ to 113′ 6¼″	6′ 6″ to 109′ 7″
19	Conglomerate,	2′ 6″ to 116′ ¼″	2′ 5″ to 112′ 0″
20	Blue rock,	6″ to 116′ 6¼″	6″ to 112′ 6″
21	Conglomerate,	3′ 8″ to 120′ 2¼″	3′ 6″ to 116′ 0″
22	Dark sandstone,	2″ to 122′ 2¼″	1′ 11″ to 117′ 117″
23	" conglomerate,	6′ 9¼″ to 129′ 0″	6′ 7″ to 124′ 6″
24	" sandstone,	7′ 6″ to 136′ 6″	7′ 3″ to 131′ 9″
25	" conglomerate,	6′ 4″ to 142′ 10″	6′ 0″ to 137′ 9″
26	Green sandstone and slate,	10′ 4″ to 153′ 2″	10′ 0″ to 147′ 9″
27	Green sandstone,	15′ 0″ to 168′ 2″	14′ 6″ to 162′ 3″
28	Red shale,	1′ 6″ to 169′ 8″	1′ 5″ to 163′ 8″
29	Green sandstone,	22′ 4″ to 192′ 0″	21′ 7″ to 185′ 3″
30	Red shale,	1″ to 192′ 1″	1″ to 185′ 4″

The following figures will to a certain extent show the possibilities of future coal production from the Newport basin on Sheet II, giving as it does, the area of workable coal beds, together with the areas already either partially or entirely mined.

Newport Basin, Mine sheet II.

	Acres.
Total area of workable coal	3248.88
Area between northern outcrop and Newport Centre anticlinal No. 1	632.35
Area between Newport Centre and Mocanaqua—Warrior Run anticlinals	1118.53
Area between Mocanaqua—Warrior Run and Wanamie Quarry anticlinals	779.56
Total area of workable coal controlled by Lehigh and Wilkes Barre Coal Company	1353.31
Total area of workable coal controlled by Susquehanna Coal Co.	1339.64
Total area of workable coal " by West End Coal Co.	425.34
Total area of workable coal " by J. H. Bowden	10.43
Total area of workable coal " by Jordan estate	12.04
Total area of workable coal " by D. L. & W. R. R. Co.	8.37
Area of Baltimore bed worked by L. & W B. Coal Co	10.00
Area of Ross bed worked by L. & W B. Coal Co	81.98
Area of Ross bed worked by Susquehanna Coal Co	22.18
Area of Red Ash or Buck Mtn. bed worked by Susquehanna Coal Co.	30.70
Area of Red Ash or Buck Mtn. worked by West End Coal Co.	
(Dupont drift)	96.82
(Hassleman drift)	17.04
Total,	113.86
Area of Ross bed worked by West End Coal Co	3.82
Area of Hillman bed worked by Susquehanna Coal Co.	1.17
Area of Mills bed worked by Susquehanna Coal Co	——
Area of shaft bed (in chrome orange on sheet) worked by Susquehanna Coal Co	15.57

The following section of the Shaft at No. 6 colliery of the Susquehanna Coal Co., will give the best representation of the coal beds and their intervening rocks to be found on this sheet, although there are one or two coal beds outcropping near the eastern boundary of the sheet, which do not appear in the section.

Section of No. 6 Shaft, Susquehanna Coal Co.

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular.*
1.	Cribbing, . . .	43' 0'' to 43' 0''	43' 0'' to 43' 0''
2.	Sandstone, . . .	93' 6'' to 136' 6''	93' 2'' to 136' 2''
3.	Coal and slate,	2' 0'' to 138' 6''	2' 0'' to 138' 2''
4.	Coal. S. dip 4°	6' 6'' to 145' 0''	6' 6'' to 144' 8''
5.	Fire clay, . . .	4' 0'' to 149' 0''	4' 0'' to 148' 8''
6.	Sandstone, . . .	33' 0'' to 182' 0''	32' 10'' to 181' 6''
7.	Slate, ...	17' 0'' to 199' 0''	17' 0'' to 198' 6''
8.	Fire clay, . . .	2' 8'' to 201' 8''	2' 8'' to 201' 2''
9.	Coal. S. dip 7°	1' 0'' to 202' 8''	1' 0'' to 202' 2''
10.	Slate. " " 7°	0' 4'' to 203' 0''	0' 4'' to 202' 6''
11.	Coal. " " 7°	2' 0'' to 205' 0''	2' 0'' to 204' 6''
12.	Dark slate, . .	18' 0'' to 223' 0''	17' 10 ' to 222' 4''
13.	" sandstone,	23 7'' to 246' 7''	23' 5 ' to 245' 9''
14.	Slate, ...	10' 0'' to 256' 7''	10' 0 ' to 255' 9''
15.	Coal. S. dip 16°	7' 11'' to 264' 6''	7' 7' to 263' 4''
16.	Fire clay, dip 16°	5' 0'' to 269' 6''	4' 9 ' to 268' 1''
17.	Coal, ...	5' 6'' to 275' 0''	5' 4'' to 273' 5''
18.	Slate, ...	4' 0'' to 279' 0''	3' 10'' to 277' 3''
19.	Fire clay, . . .	2' 0'' to 281' 0''	2' 0'' to 279' 3''
20.	Fine sandstone,	13' 0'' to 294' 0''	12' 6'' to 291' 9''
21.	Coal and bony,	1' 4'' to 295' 4''	1' 4'' to 293' 1''
22.	Fire clay, . . .	33' 0'' to 328' 4''	31' 9'' to 324' 10''
23.	Black slate, . .	0' 6'' to 328' 10''	0' 6'' to 325' 4''
24.	Coal. S. dip 17°	2' 10'' to 331' 8''	2' 9'' to 328' 1''
25.	Slate, ...	1' 3'' to 332' 11''	1' 3'' to 329' 4''
26.	Coal, ...	0' 6'' to 333' 5''	0' 6'' to 329' 10'
27.	Slate, ...	2' 5'' to 335' 10''	2' 4'' to 332' 2''
28.	Dark sandstone,	26' 0'' to 361' 10''	24' 10'' to 357' 0''
29.	Slate, ...	11' 6'' to 373' 4''	11' 0'' to 368' 0''
30.	Fire clay, . . .	3' 6'' to 376' 10''	3' 4'' to 371' 4''
31.	Coal. S. dip 19°	4' 0'' to 380' 10''	3' 9'' to 375' 1''
32.	Bony, ...	0' 6'' to 381' 4''	0' 6'' to 375' 7''
33.	Coal, ...	2' 0'' to 383' 4''	1' 11'' to 377' 6''
34.	Bony, ...	0' 2'' to 383' 6''	0' 2'' to 377' 8''
35.	Soft slate, ...	1' 0'' to 384' 6''	1' 0'' to 378' 8''
36.	Sandstone, . .	24' 4'' to 408' 10''	23' 0'' to 401' 8''
37.	Slate, ...	7' 0'' to 415' 10''	6' 8'' to 408' 4''
38.	Bony, ...	0' 6'' to 416' 4''	0' 6'' to 408' 10''
39.	Slate, ...	1' 7'' to 417' 11''	1' 6'' to 410' 4''
40.	Coal, shelly and dirt, ...	3' 2'' to 421' 1''	3' 0'' to 413' 4''
41.	Coal, shelly and dirt. S. dip 20°	2' 3'' to 423' 4''	2' 2'' to 415' 6''
42.	Fire clay, . . .	3' 3'' to 426' 7''	3' 1'' to 418' 7''
43.	Slate, ...	1' 8'' to 428' 3''	1' 7'' to 420' 2''
44.	Bony and slate,	0' 7'' to 428' 10''	0' 7'' to 420' 9''
45.	Coal, ...	0' 5'' to 429' 3''	0' 5'' to 421' 2''

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular.*
46.	Slate, ...	0′ 5″ to 429′ 8″	0′ 5′ to 421′ 7″
47.	COAL, ...	1′ 3″ to 430′ 11″	1′ 2″ to 422′ 9″
48.	Fire clay, . . .	4′ 0″ to 434′ 11″	3′ 9″ to 426 6″
49.	Sandstone, . . .	59′ 4″ to 494′ 3″	55′ 9″ to 482′ 3″
50.	Slate and bony. S. dip 20°, . .	3′ 9″ to 498′ 0″	3′ 6″ to 485′ 9″
51.	Sandstone, . . .	29′ 7″ to 527′ 7″	27′ 10″ to 513′ 7″
52.	Slate, ...	14′ 0″ to 541′ 7″	13′ 2″ to 526′ 9″
53.	COAL, ...	1′ 6″ to 543′ 1″	1′ 5″ to 528′ 2″
54.	Slate, ...	20′ 5″ to 563′ 6″	19′ 3″ to 547′ 5″
55.	COAL, ...	0′ 7″ to 564′ 1″	0′ 7″ to 548′ 0″
56.	Slate, ...	1′ 7″ to 565′ 8″	1′ 6″ to 549′ 6″
57.	COAL, ...	2′ 0″ to 567′ 8″	1′ 10″ to 551′ 4″
58.	Slate and bony,	0′ 5″ to 568′ 1″	0′ 5″ to 551′ 9″
59.	COAL. S. dip 16°	1′ 3″ to 569′ 4″	1′ 3″ to 553′ 0″
60.	Slate, ...	2′ 0″ to 571′ 4″	1′ 11″ to 554′ 11″
61.	Fine conglomerate, ...	81′ 8″ to 653′ 0″	78′ 6″ to 633′ 5″
62.	Slate, ...	2′ 0″ to 655′ 0″	1′ 11″ to 635′ 4″
63.	Sandstone, . . .	31′ 0″ to 686′ 0″	29′ 10″ to 665′ 2″
64.	Slate, ...	22′ 0″ to 708′ 0″	21′ 2″ to 686′ 4″
65.	COAL. S. dip 16°	4′ 0″ to 712′ 0″	3′ 10″ to 690′ 2″
66.	Fire clay. S. dip 16°, ...	3′ 6″ to 715′ 6″	3′ 5″ to 693′ 7″
67.	COAL. S. dip 16°	5′ 0″ to 720′ 6″	4′ 9″ to 698′ 4″
68.	Slate. " " "	1′ 0″ to 721′ 6″	1′ 0″ to 699′ 4″
69.	COAL. " " "	7′ 6″ to 729′ 0″	7′ 3″ to 706′ 7″
70.	Rock and fire clay. S. dip 16°	12′ 6″ to 741′ 6″	12′ 1″ to 718′ 8″
71.	COAL and slate,	7′ 6″ to 749′ 0″	7′ 3″ to 725′ 11″

The shaft and tunnel at the No. 6 colliery have extensive workings in the beds which are cut by them. The following sections taken at various places in the workings will show the character of the coals mined.

Section of Ross bed taken in east gangway of tunnel workings 330 feet from tunnel:

Top, sandstone.

COAL, ...	6″	
Slate, ...		5″
COAL, ...	6″	
Slate, ...		4″
COAL, ...	10″	
Slate, ...		1″
COAL, ...	3′ 0″	
Slate, ...		3″
COAL, ...	7″	
Total, ...	5′ 5″	1′ 1″

Section of Twin bed taken at face of East gangway of tunnel workings:—

Top, soft slate.

Coal,	1′ 7″	
Slate,		3″
Coal,	1′ 0′	
Rock,		1′ 0″
Coal,	1 0 ′	
Slate,		2″
Coal,	1′ 8″	
Slate,		1 ′
Coal,	1′ 0′	
Bony,		6″

Bottom, fire clay.

Totals,	6′ 3″	2′ 0″

Section of Twin bed taken in West gangway of tunnel workings 400′ from tunnel.

Top, soft slate.

Coal,	7″	
Slate,		1″
Coal,	1′ 0″	
Bony,		3″
Rock,		1′ 0″
Coal,	1′ 2 ′	
Slate,		3″
Coal,	5″	
Slate,		4″
Coal,	2 ′	
Slate,		2″
Coal,	4″	
Bony,		5″
Totals,	3′ 8″	2′ 6″

Section of upper bed in shaft workings, east gangway, 300′ east of Shaft.

Top.

Coal pure,	5′ 10″

Bottom.

Section of Twin Bed in shaft workings, west gangway, 125′ west of shaft.

Top.

Coal,	4′ 0′	
Fire clay,		4′ 0′
Coal,	2′ 6″	
Slate,		10″
Coal,	1′ 2″	
Shale,		2′
Coal,	4″	

Slate,				1″
Coal,	2	7″		
Slate,		½		
Coal,	2	6″		
Bottom.				
Totals,	13′	1	5′	1½′

The No. 6 colliery of the Susquehanna Coal Co., which is one of the largest in the northern coal field, is opened by a shaft, tunnel and slope. The surface plant has probably no superior in the anthracite region. The breaker has a probable capacity of 2000 tons per day, and is filled with the most modern appliances known in the preparation of coal.

During the past year a town of over one thousand inhabitants has sprung up in the vicinity of this mine. Everything points to the permanency of the town's rapid growth, and the probability of a large production from the colliery.

Adjoining the Susquehanna Coal Co.'s property on the east is that of the Lehigh and Wilkes Barre Coal Co. These lands extend across the coal field and include the entire width of the Newport basin. There are no mining developments on this property other than those along the extreme southern outcrop at the Wanamie collieries. But, as the basin rises from the east towards Glen Lyon all the coal beds cut in the Susquehanna Coal Co.'s No. 6 shaft will be found on the Lehigh and Wilkes Barre tract, while on its eastern boundary one or possibly two additional beds will outcrop.

Adjoining the Susquehanna Coal Co.'s property on the west are the lands operated by the West End Coal Co.

This property includes within its borders the western end of the Newport and Priscilla Lee No. 1 basins and all of the Black Creek and Priscilla Lee No. 2 basins. So that while in the matter of ownership there are several interests involved in the Newport and Priscilla Lee No. 1 basins, the characters and conditions of the coal beds of the Priscilla Lee No. 2 and Black Creek basins in a commercial sense only directly effect those interested in the West End property.

This company is working the Dupont drift in the Newport basin, the largest portion of their mine production coming from this opening. These workings have now extended eastward to within several hundred feet of the old Dr. James house now occupied by Mr. Lem. Uplinger.

The Dupont drift mines the Red Ash bed, an average section of which is as follows:

Top, sandstone.		
Coal,	2' 2"	
Bony,		1"
Coal,	1' 7"	
Bony,		2"
Coal,	11"	
Dirt parting.		
Coal,	2' 5"	
Slate,		2"
Coal,	1' 10"	
Bottom, sandstone.		
Totals,	8' 11"	5"

Just north of the wagon road and east of the Dupont drift, a drift is opened on the Ross bed, the one next higher than the Red Ash. The gangway from this drift has already been extended to the east a distance of 1500 feet.

A section of the bed mined is as follows:

Top.		
Slate and bone,		1' 0"
Coal,	2' 0"	
Slate,		2"
Coal,	9"	
Slate,		6"
Coal,	8"	
Slate,		2"
Coal,	2' 0'	
Bottom, slate.		
Totals,	5' 5"	1' 10"

The coal from the Ross drift as well as that from the Dupont drift is prepared for market at the West End Breaker No. 1.

On the north side of Black Creek, west of the west edge of Black Creek swamp, about one mile from the Dupont drift and ½ mile from Teasdale City, is what is known as the Hasselman opening, which also operates the Red Ash bed. An average section of the bed shows:

Top.		
Bone,		8″
Slate,		2″
Good coal,	2′ 8″	
Slate,		2″
Good coal,	0′ 8″	
Slate,		4
Poor coal, slate and bone,	1′ 10″	
Good coal,	6′	
Slate, bone, &c.,		1
Good coal,	1′ 10″	
Bottom.		
Totals,	7′ 6″	1′ 5″

A section of the Red Ash bed at the James opening, 2000 feet west of the Hasselman drift shows:

Top.		
Bone,		5″
Slate,		1″
Good coal,	2′ 8″	
Slate,		2″
Good coal,	9′	
Slate,		5″
Poor coal,	9″	
Slate,		2″
Bone,	1′ 0″	
Good coal, } this bench in fault,	1′ 0″	
Slate and bone, } this bench in fault,		2′ 3″
Bottom.		
Totals,	6 2″	3′ 6′

The following section taken at the East end opening 2400 feet north-east of the Hasselman drift is supposed to be of the Red Ash bed. It shows:

Top.		
Good coal,	6′ 2″	
Slate,		2″
Good Coal,	10″	
Slate,		4″
Poor coal,	2′ 0″	
Good coal,	1′ 5″	
Bottom.		
Totals,	6′ 9′	6″

The West End Breaker No. 2, which prepares the Hasselman coal for market, is at present idle, waiting the progress of the gangways from the inside slope of the Dupont drift to develop the Newport basin to the north.

The Teasdale opening which is supposed to be on the same bed as the Hasselman opening, was originally opened by drift, and from it a slope was started which was expected to be driven to the bottom of the basin. Owing to the steep irregular dips which it encountered it has been for the present suspended, until the gangways from the Dupont drift shall have advanced sufficiently to the east to render possible the driving of a slope up from below to meet the already opened Teasdale slope.

In addition to the colliery workings in this basin already noted, there are several openings the workings of which are of limited extent. The most notable instances of this kind are the drift at Mackey's clearing 1¾ miles west of Wanamie and the Shoemaker drifts, east of Glen Lyon. No map records of the workings of these smaller openings have been preserved. The following sections show the character of the coal-beds at the Shoemaker drifts.

Section of coal-bed at Shoemaker drifts east side of Middle Branch of Newport Creek:

Top.		
Coal,	5′ 0″	
Slate,		1′ 0″
Coal,	4′ 9″	
Slate,		7″
Coal,	2′ 3″	
Bottom.		
Totals,	12′ 0″	1′ 7″

Section of coal-bed at Shoemaker drift west side of Middle Branch of Newport Creek:

Top.		
Coal,	?	
Slate,		1′ 8″
Coal,	7′ 0″	
Bottom.		
Totals,	7′ 0′	1′ 8″

A number of trial shafts have been sunk in various parts of this basin. The records of many of these shaftings have been destroyed. The following, however, will show the character of some of the beds cut.

Section in shafting on Buck Mountain, (Red Ash) bed 2400′ northwest from Uplingers:

Top, slate, 7′ 4″		
Coal,	2′ 5″	
Slate,		6″
Coal, good,	5′ 0″	
Bony coal,		3″
Coal, good,	1′ 9″	
Bottom.		
Totals,	9′ 2″	9″

Section in shafting on Buck Mountain (Red Ash) bed on land line between Susquehanna Coal Company's and West End Coal Company's properties and 2000′ north from Uplingers.

Top sandstone, 12′ 0″		
Coal,	9′ 0″	
Bony,		1″
Coal,	2′ 0″	
Bottom.		
Totals,	11′ 0″	1″

Section in shafting 1600′ northwest of Uplingers.

Top.		
Coal,	1′ 2″	
Slate,		6″
Coal,	3′ 9″	
Bottom.		
Totals,	4′ 11″	6″

Section in shafting 1400′ northwest of Uplingers.

Top.	Gray sandstone.	
	Red clay,	3′ 0″
	Slate,	7′ 0″
	Good coal, without slate,	9′ 0″
	Total,	9′ 0″

Priscilla Lee basin No. 1.

The Priscilla Lee basin No. 1, which has been before mentioned in connection with the outcrop of the Red Ash bed, is one which has not as yet been extensively mined. It is a southern spur of the Newport basin, the coal measures of which are not separated from it. On the eastern border of sheet No. II, in the workings of the Wanamie No. 19 colliery, the Baltimore, Ross and Red Ash beds have been developed.

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At the No. 2 colliery of the West End Coal Company, a tunnel has been driven in this basin which cuts five beds. The colliery workings, however, at the latter tunnel have not been extended either east or west of the tunnel, except in the case of the 2d bed, 240 feet from the tunnel mouth. A gangway on this bed has been driven 325 feet west.

About 1200 feet south of the Hasselman drift and 200 feet west from the above mentioned tunnel, Diamond Drill bore hole No. 3 was sunk which also cuts 5 beds on the opposite south dip. The appended sections of the beds cut in No. 3 bore hole will serve to show the character and condition of the beds in this immediate locality.

1st Bed.

Top, dark sand slate.		
Soft coal,	1' 1"	
Black slate,		2' 0"
Soft coal,	2' 4"	
Slate,		3"
Bottom, sandslate.		
Totals,	3' 5'	2' 3"

2d Bed.

Top, sandstone, coarse.
Coal, ... 6 6
Bottom, black slate.

3d Bed.

Top, gray rock, coarse.
Coal and slate, ... 4 5"
Bottom, sandslate.

4th Bed.

Top, sandslate.
Coal, soft, ... 7' 5"
Bottom, sandslate.

5th Bed.

Top, soft slate.
Coal, ... 6' 6"
Bottom, slate.

The structure of this basin from Wanamie to a point about 4000 feet west of the West End No. 2 tunnel seems comparatively simple as the outcrop protected by the steep north dipping conglomerate remains undisturbed, but from this point west to the end of the basin, the dips are sufficiently complicated to produce many difficulties in mining. It will be observed that at the end of this basin a complete break in its continuity is shown. This interpretation is disputed by local maps. The fact that a basin in the Red Ash bed and overlying measures rises to day in the hollow at this point is patent to any one who has been on the ground. In the hollow the south outcrop is completely eroded and the rocks exposed in the hillside have a clearly defined south dip of about 28 degrees. These south dips continue west along the hillside for about 1200 feet where they are superceded by an opposite dip of 65 degrees. The crest of the anticlinal immediately North of the exposed basin in the hillside is concealed. It shows east and west of this point along the cliff for several hundred feet before being lost in the north dipping rocks of the second or more western basin.

In order to make a proper distinction we have called the eastern basin Priscilla Lee No. 1 and the western and smaller basin Priscilla Lee No. 2.

The point in question is whether the Red Ash bed outcrops on the south side of this anticlinal or whether it folds over before reaching the surface. If the latter view is correct the coal extending from the West End No. 2 colliery to the western end of the Wilkes-Barre mountain may possibly all be mined from the tunnel at that colliery without driving additional inside tunnels, but if the former, such working will be absolutely impossible.

The survey considers the outcrop line as indicated on the sheets by far the more probable structure.

As has before been stated, the Priscilla Lee basin No. 1 as a distinctive basin has its most western development in the workings of the Wanamie collieries of the Lehigh and Wilkes Barre Coal Co. The anticlinal which separates this basin from that next basin to the north is distinctly shown in the colliery workings of the Baltimore and Ross beds at Colliery No. 19. Shaftings have been made on both dips of the basin at various points along its course to the west.

The Pottsville conglomerate underlying this basin is not exposed until it reaches the extreme western end of the mountain overlooking the Shickshinny gap.

At the West End No. 2 colliery the conglomerate is exposed on the axis of the Wanamie Quarry anticlinal between Hasselman's opening and the south dipping outcrop of the Priscilla Lee basin. At this point the colliery developments, together with records of the Diamond Drill bore holes of the West End Coal Company, clearly define the outcrop of the Red Ash bed except near the point where it crosses the anticlinal axis. From here to the west the Red Ash is not shafted but is shown in a very clearly defined terrace for a distance of 3000 feet, at which point the dips become so confused that no definite location of the outcrop is possible.

Whether the coal beds along the south outcrop of the basins, with their almost perpendicular dips, will retain the thickness and condition found in the flatter dipping measures to the north, can only be discovered as mining operations progress.

The section of the Diamond Drill Bore-hole No. 3 is an actual proving of the character and position of the coal beds and their intermediate strata in the Priscilla Lee Basin No. 1 in the vicinity of the West End Colliery No. 2.

Priscilla Lee basin No. 1.

Section of Bore Hole No 3, West End Coal Company, 1200 feet south of the Hassleman Opening. Drilled at right angles to the measures. Dip of measures 45° south.

No. of Strata.	*Description.*	*Thicknesses perpendicular to dip.*				
1	Gray sandstone,	33′	10″	to	33′	10″
2	" " coarse,	7′	6″	to	41′	4″
3	" " dark,	1′	0″	to	42′	4″
4	Dark sand slate,	20′	2″	to	62′	6″
5	Soft coal,	1′	2″	to	63′	8″
6	Black slate,	2′	0″	to	65′	8″
7	Soft coal,	2′	4″	to	68′	0″
8	Slate,		3″	to	68′	3″
9	Sand slate,	6′	11″	to	75′	2″
10	Sand stone, gray,	25′	4″	to	100′	6″
11	" " coarse,	2′	5″	to	102′	11″
12	Coal,	6′	6″	to	109′	5″

No. of strata.	Description.	Thicknesses perpendicular to dip.				
13	Black slate,	6'	1"	to	115'	6"
14	Gray sandstone,	5'	0"	to	120'	6"
15	Black slate,		6"	to	121'	0"
16	Gray sand stone,	19'	4"	to	140'	4"
17	Coarse gray rock,	7'	3"	to	147'	7"
18	Slate with a little coal,		11"	to	148'	6"
19	Sand slate,	5'	4"	to	153'	10"
20	Coarse gray rock,	6'	6"	to	159'	10"
21	Coal and slate,	4'	5"	to	164'	3"
22	Sand slate,	13'	10"	to	178'	1"
23	Blue sand stone,	59'	7"	to	237'	8"
24	Sand slate,	4'	8"	to	242'	4"
25	Coal, soft,	7'	5"	to	249'	9"
26	Sand slate,	19'	10'	to	269'	7"
27	Gray sand rock,	39'	4"	to	308'	11"
28	Sand slate,	1'	6'	to	310'	5"
29	Dark gray rock,	29'	4"	to	339'	9"
30	" " Sand stone,	4'	3"	to	344'	0"
31	Soft slate,	1'	6"	to	345'	6"
32	Coal,	6	6"	to	352'	0"
33	Slate,	4'	0"	to	356'	0"
34	Sand stone,	4'	0"	to	360'	6"
35	Gray rock,	5'	6"	to	365'	6"

In the Priscilla Lee basin, on Mine sheet II, there are 743.27 acres of workable coal, sub-divided as follows:

Controlled by Lehigh & Wilkes Barre Coal Company,	331.01 acres.
" " Susquehanna Coal Company,	249.91 "
" " West End Coal Company,	162.35 "
Area of Baltimore bed worked by Lehigh & Wilkes-Barre Coal Company,	66.70 "
Area of Ross bed worked by Lehigh & Wilkes-Barre Coal Company,	24.09 "
Area of Red Ash bed worked by Lehigh & Wilkes-Barre Coal Company,	10.71 "

Priscilla Lee basin No. 2.

The Priscilla Lee basin No. 2, which extends from a point 500′ west of the most western exposure of the Priscilla Lee basin No. 1, to the western end of the Wilkes Barre mountain, is entirely undeveloped. The only coal shafting within its borders is near the axis of the Wanamie Quarry anticlinal on the mountain crest at a point 1100′ south of the Black Creek tunnel.

The south outcrop of the Red Ash bed in this basin, while not opened, is clearly defined by the surface topography in connection with the north dipping conglomerate. This outcrop which so plainly shows on the south side of the basin can be followed around the basin's western end and thence along the northern outcrop to the south dipping rocks in the coal shaft which has already been mentioned.

In tracing the outcrop of this basin from here to the east its identity is lost in the confused dips existing along its north edge, while the exact definition of its eastern boundary is impracticable. The local rolls and confusion of dips noted on these sheets along the crest of the mountain will plainly show the difficulties of reaching a definite conclusion as to the outcrop of the coal beds. Over a large part of this area including its southern and western portion the dips are very regular but the extreme northeastern part of the basin is broken by irregular dips in all directions. If this basin is an isolated one, and every indication seems to prove that such is the fact, it will be one difficult to mine from the fact of its isolation as well as from its position on the summit of the mountain. A succession of shaftings would throw much light on the position and number of the coal beds in this and the Priscilla Lee No. 1 basins, both of which are now concealed in the confusion of the many dips. The area of workable coal in this basin is 67.87 acres.

Black Creek basin.

The Black Creek basin is about 6600 feet long and extends from the West End No. 1 breaker to the sharp northwest bend in Black Creek 1600 feet south of the Dupont drift. Its principle mine openings are the Conyngham and Mud drifts and the Black Creek tunnel on the Red Ash bed; the Golden drift on the Ross bed and the "Church" drift on the Church bed. The Mud drift which was opened within a few feet of the lowest point of the outcrop of the Red Ash bed, in the western end of the basin, is at present the most important opening. Its gangways are driven on the north and south dips and as they extend east the distance between them gradually increases.

500 feet from the mouth of the drift they are 100 feet

apart, while at the present face of the gangways they are separated by a distance of 1100 feet. An average section of the bed in this drift is:—

Top.		
Coal,	1′ 8″	
Bony,		4′
Coal,	8	
Slate,		2′
Coal,	9″	
Shale,		1 0″
Coal,	4′ 2″	
Slate,		3″
Bottom, sandstone.		
Totals,	7′ 3″	1′ 9″

The breasts on the more southern gangway of the Mud drift develop the anticlinal upon which the air shaft was sunk. The northern gangway developed the south dip which has an unbroken rise to its outcrop above the Pottsville conglomerate capping the hill overlooking the river.

Until recently it was supposed that the bed worked in the Mud drift was identical with that worked in the Conyngham drift and in the Black Creek tunnel. While endeavoring to connect the Mud and Conyngham drifts the fact was developed that they were on separate beds. A tunnel has been driven south from the Mud drift into the Conyngham drift and another north from the south dip gangway of the Mud drift into the south dipping bed corresponding to that worked in the Conyngham drift. This latter bed along the north dip was cut in fault, but gangways are now being pushed eastward, which will probably develop this bed in its normal condition.

The Black Creek tunnel, 40 feet in length, cuts the north dipping crop of the Red Ash bed as it rises in the north slope of the Wilkes Barre mountain.

The mining operations at this tunnel are at present suspended. The Diamond Drill Bore hole No. 4, of the West End Coal Co. (a record of which follows below) was sunk from the bottom of the Red Ash bed at the face of the tunnel. It was drilled at an angle of 83 degrees with the pitch for a depth of 110′ without cutting any coal.

Section of Bore Hole No. 4 in Black Creek Drift, Black Creek Basin, Starting on bottom of Black Creek bed. West End Coal Co.'s Pitch of Bore Hole 66½ south. Dip of measures 30° north.

No. of Strata.	Description.	Thickness along Bore Hole.	Distance perpendicular to dip.
1	Sand slate, ...	8 0″ to 8′ 0″	8 0″ to 8 0′
2	Dark sandstone, ...	4′ 0″ to 12′ 0″	4′ 0″ to 12′ 0″
3	Sand slate, ...	3′ 0″ to 15′ 0″	3 0″ to 15′ 0″
4	Gray standstone, conglomerate, ...	4′ 8″ to 60′ 8″	45′ 5″ to 60′ 5″
5	Sand slate, ...	6″ to 61′ 2″	6″ to 60′ 11″
6	Dark gray sand-stone, .	26′ 2″ to 87′ 11″	26′ 0″ to 86′ 11
7	Conglomerate, ...	22′ 8″ to 110′ 0″	22′ 6″ to 109′ 5′

The record of this hole is an indication in addition to the one already noted in the Diamond Drill Bore hole No. 1 at the Dupont drift that the bed worked in both openings (Dupont drift and Black Creek tunnel) is the bottom or Red Ash. A section here shows:

Top, sandstone.		
Coal, ...	1′ 2″	
Slate, ...		4″
Coal, ...	1′ 5″	
Slate, ...		8″
Coal, ...	2′ 7″	
Bottom sandstone.		
Total, ...	5′ 2″	1 0′

The Golden drift is opened on the north dip of the Ross bed 1250′ south of the Dupont, near the sharp bend in Black Creek. An average section of the bed mined here shows:

Top.		
Coal, ...	2′ 0″	
Hard bone and slate, ...		1′ 0″
Coal, ...	7″	
Bone, ...		3′
Coal, ...	6″	
Bone, ...		2″
Coal, ...	1 0″	
Bottom.		
Total, ...	4′ 1″	1′ 5′

A third drift has recently been opened 400 feet southwest of the Golden drift which develops the Church bed. This is the next bed overlying the Ross. A section taken in this drift shows:

Top.		
Slate exposed,		1' 0"
Coal,	10"	
Bone, slate and coal,		1' 0"
Coal,	1' 10"	
Dirt,		2"
Coal,	8"	
Bottom.		
	3' 4"	2' 2"

In addition to these mine workings the Church, Ross and Red Ash beds are shafted upon at various points throughout the Black Creek basin.

The highest measures in this basin are cut in the Diamond Drill Bore hole No. 2 of the West End Coal Co., the record of which is as follows:

Bore hole No. 2 Black Creek Basin West End Coal Co.
Drilled perpendicular to measures.

No. of Strata.	*Description.*	*Thicknesses perpendicular to dip.*				
1.	Blue sandstone,	18'	6"	to	18'	6"
2.	Sand slate,	4'	4"	to	22'	10"
3.	Dark sandstone and conglomerate,	1'	6"	to	24'	4"
4.	" gray sandstone,	4'	0"	to	28'	4"
5.	" sandstone and conglomerate,	1	2"	to	29'	6"
6.	" gray sandstone,	12'	4"	to	41'	10"
7.	Fine dark conglomerate,	3	0"	to	44'	10"
8.	Black slate,	1'	3"	to	46'	1"
9.	Fine dark conglomerate,	1'	1"	to	47'	2"
10.	*Coal* and slate,	4	0'	to	51'	2"
11.	*Coal*,	4'	11"	to	56'	1"
12.	Slate and soft stuff,	1'	2"	to	57'	3'
13.	Dark sand stone,	6'	0"	to	63'	3"
14.	Light, " "	19'	8"	to	82'	11"
15.	*Coal*, good,	3'	2"	to	86'	1'
16.	Black slate,	5	4"	to	91'	5"
17.	*Coal*, poor,	3'	0"	to	94'	5"
18.	Black slate,	2'	9"	to	97	2"
19.	Gray sandstone,	32'	2"	to	129	4"
20.	Sand slate,	8'	10"	to	138'	2"
21.	Gray sandstone,	10'	3'	to	148'	5"
22.	*Coal*,	6'	9"	to	155'	2"

No. of Strata.	Description.	Thicknesses perpendicular to dip.				
23.	Sand slate,	3'	8"	to	158'	10"
24.	Gray rock,	23'	8"	to	182'	6"
25.	*Coal*,		2"	to	182'	8"
26.	Dark rock,	1		to	183'	8"
27.	Sandstone,	4'		to	187'	8"
28.	Dark conglomerate,	4'	10"	to	192'	6'
29.	" sandstone,	2'	0'	to	194'	6'
30.	" conglomerate,	5'	10"	to	200'	4"
31.	Sand slate,	6'	5"	to	206'	9"
32.	Fine dark conglomerate,		10"	to	207'	7"
33.	Black slate,		4"	to	207'	11"
34.	Fine dark conglomerate,	5'	3"	to	213'	2"
35.	Conglomerate,	6'	1"	to	219'	3"
36.	Black slate,		3"	to	219'	6'
37.	Sandstone,	4'	8"	to	224'	2
38.	Blue sandstone,	4'	2"	to	228'	4"
39.	Sand slate,	1'	5"	to	229'	9"
40.	Black slate,		4"	to	230'	1"
41.	*Coal*,	3'		to	233'	1"
42.	Slate,		5½"	to	233'	6½"
43.	*Coal*,	3'	0½"	to	236'	7"
44.	Sand slate,	13'	10"	to	250'	5"
45.	*Coal*,		9"	to	251'	2"
46.	Sand slate,	5'	9"	to	256'	11"
47.	Gray sandstone,	31'	0"	to	287'	11'
48.	Slate,		5"	to	288'	4"
46.	Dark gray rock,	19'	1"	to	307'	5"
50.	*Coal*, good,	2'	8'	to	310'	1"
51.	Slate,		4"	to	310'	5"
52.	*Coal*, good,	2	6"	to	312'	11"
53.	*Coal*, soft,	3'	4"	to	316'	3"
54.	*Coal*,	6'	8"	to	322'	11'
55.	Dark sandstone,	13'	2"	to	336'	1"
56.	Gray "	7'	0"	to	343'	1'
57.	Dark conglomerate,	3'	0"	to	346'	1"
58.	Sandstone,	1.	10"	to	347'	11"
59.	Conglomerate,		5"	to	348'	4"

The following bed sections show the condition and character of the beds cut in this hole:

1st Bed.

Top, conglomerate.				
Coal and slate,	4	0"		
Coal,	4	11"		
Slate and soft, stuff dark,			1	2'
Totals,	8'	11'	1'	2"

2d Bed.

Top, light sandstone,		
Coal, good,	3′ 2″	
Black slate,		5′ 4″
Coal, poor,	3 0″	
Bottom, black slate.		
Totals,	6′ 2″	5′ 4″

3d Bed.

Top, sandstone, gray.		
Coal,	8″	
Slate,		1″
Coal,	1′ 3″	
Slate and bone,		3″
Coal,	1 0″	
Slate and bone,		2″
Coal,	2′ 7	
Bottom, sandslate.		
Totals,	5′ 6″	6′

4th Bed.

Top sand slate.		
Black slate,		.4″
Coal,	3′ .0″	
Slate,		.6″
Coal,	3′ .0″	
Bottom sandslate.		
Totals,	6′ .0″	.10″

5th Bed.

Top, dark gray rock.		
Good coal,	2′ .8″	
Slate,		.4″
Good coal,	2′ .6″	
Soft coal,	3′ .4″	
Coal,	6′ .8″	
Bottom, dark sandstone.		
	15′ .2″	4″

There are 243.30 acres of workable coal in the Black creek basin, all of which is controlled by the West End Coal Company. The worked areas are as follows:

Red Ash Bed, Upper split, Mud drift,	**12.63 acres.**
" " " Lower " Conyngham drift,	**6.61 "**
" " " " " Black Creek tunnel,	**3.67 "**
Ross Bed Golden Drift,	**4.26 "**

Church.

The coal measures of the Black Creek basin are isolated from those of the other basins.

The outcrop of the Red Ash bed as has already been noted is developed by the mine workings of the Mud drift, Conyngham drift and the Black creek tunnel. Its outcrop is shown by their workings from a point northeast of the West End No. 1 breaker, near where the south dip airway from the Mud drift has been driven to day. west along its northern outcrop, then south along the extreme western exposure of the basin overlooking the river, then east along its south dip to the Black Creek tunnel where it is seen plainly rising along the north slope of the mountain until nearing the crest it turns to the southwest, then sharply to the east a distance of 800′ and again follows north down the mountain side until it reaches the plainly marked hollow east of the mouth of the Black Creek tunnel. Following this hollow until Black creek is reached, it runs along the south bank of the creek until at a point near the Golden drift on the Ross bed it crosses the creek and is lost in the steep dipping measures at the foot of the high cliff which is such a prominent feature in the topography of this basin.

From here west to our starting point near the airhole the broken character of the outcropping rocks and the confusion of their dips make the location of the outcrop very uncertain.

The north dips of the Black Creek basin are, as far as can be seen from the surface indications, very regular. The same is true of the south dips on the north side of the basin for a distance of about ½ mile from its western end. Here the dips become steeper and somewhat confused while opposite the high cliff west of the Dupont drift they become so irregular that all indication as to the position of the coal bed is lost.

Salem basins.

On the west side of the Susquehanna, separated by the river gap from those more directly a part of the Wyoming basin, are the Salem basins. These basins are the extreme western continuation of the intermediate basins of the Wyoming or Northern coal-field and extend from the eastern face of Rocky mountain overlooking the river to about two miles west. The Pottsville Conglomerate underlying them outcrops on the north and south side of the mountain and its minor rolls bring the outcrop of the Red Ash bed to day-light, forming several local basins. The bottom of the conglomerate, however, at no point reaches the surface within the areas thus made barren of coal. These local basins surrounded by the Red Ash crop are the Beadle or Counter basin, the No. 4 basin, Spike Island basin and the Paddy Run-Crary basin.

The Red Ash bed in all of them has been thoroughly mined and robbed.

The most important basin both in extent and production is the Counter, which also includes what is known as the Beadle basin.

The Counter basin is two miles in length and in addition to the Red Ash bed which, through the Salem basins is known as the B or Buck mountain, includes limited areas of the Ross or C and a small bed still higher known as the D bed. The A bed is not workable though its thickness as developed in this basin (which has before been noted) is exceptionally great.

An average section of the B bed in the Counter basin shows:

Top.			
Coal,	1'	.10"	
Slate,			.6"
Bone,			.6"
Slate,			.8"
Coal,	4'	.2"	
Bottom.			
Totals,	6'	.0"	1' .8"

It is impossible to enter the workings of these basins, many portions of which have been closed for years. No description other than that shown by the map of the workings is therefore practicable. The course of the mine workings will be noted as indicating a number of local synclinals and anticlinals.

The C and D beds have been shafted at various points but have never been worked. The thicknesses reported by the company as shown in these shaftings is as follows:

C. Bed. About 700′ northeast of tunnel.

Top coal,	6′
Slate,	
Bottom coal,	

C. Bed. About 700′ northwest of tunnel.

Coal bed,	6′

D. Bed. Near center of basin south side.

Coal,	6

D. Bed. Near western end of basin, north side.

Coal,	4′

A. Bed. Where cut in tunnel.

Top, sandstone.	
Coal,	1′
Slate and coal,	1′
Bottom, sandstone.	

D. Bed. Near center of basin north side.

Coal,	3′

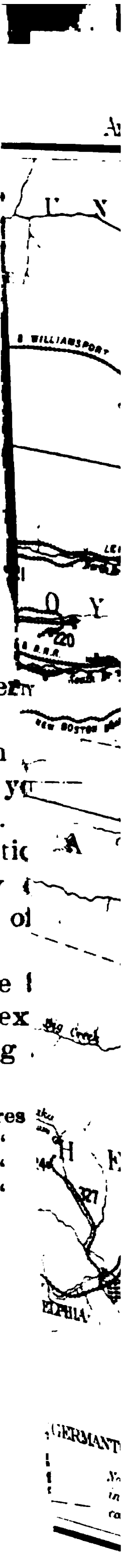
There is no irregularity in the dips of the Counter worthy of note.

The Spike Island basin, the smallest of the Salem is entirely mined out and has been closed for some y

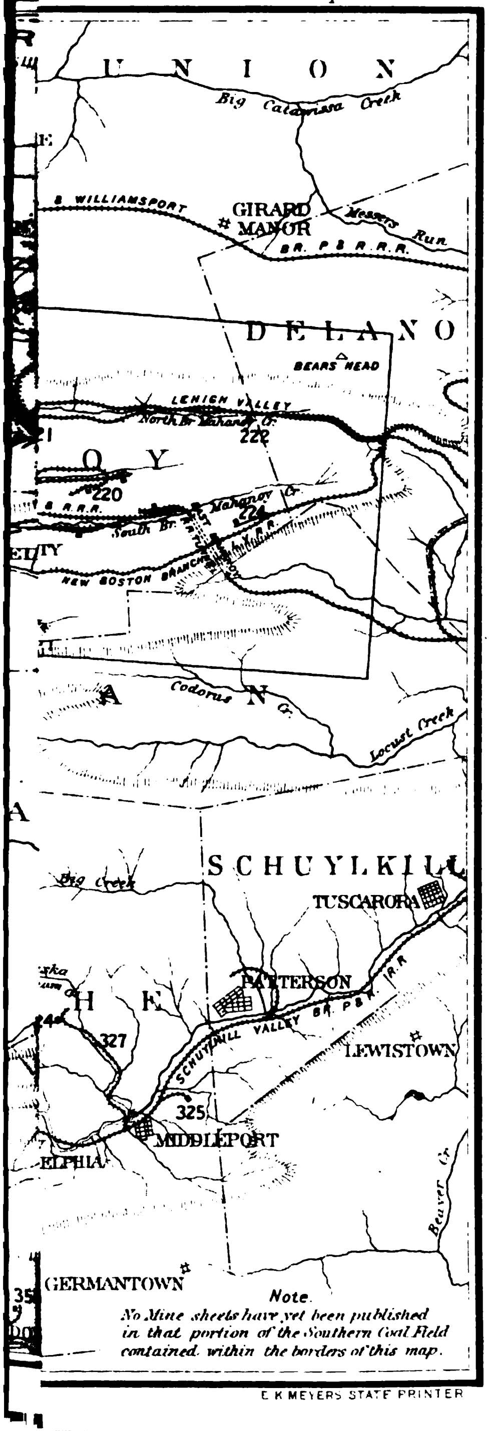
The same is true of the Paddy Run-Crary basin. basin is broken by a very sharply overturned anti The fact of the mine workings being completely renders it impossible to make any examination o overturn.

The Salem Coal Co. own the entire area of the basins, with the exception of a small portion at the ex western end of the Counter basin. The following ment will show the acreage of each local basin.

Counter basin,	198.34	acres
No. 4 basin,	21.30	"
Spike Island basin,	3.37	"
Crary—Paddy Run basin,	22.62	"



Annual Report 1886.



Note.

No Mine sheets have yet been published in that portion of the Southern Coal Field contained within the borders of this map.

E. K. MEYERS STATE PRINTER

CHAPTER III.

Survey of the Western Middle coal field.

The mine sheets of the Western Middle Coal Field, as constructed by the Geological Survey, are similar in character to those which have already been described in report AA and in the Annual Report of 1885.

In the latter report there was given a brief reference and description of the mine and cross section sheets, which had been finished up to that time. These sheets were published in the Western Middle Coal Field Atlas, Part 1. They are 11 in number, as follows:

Four Mine and Geological sheets, scale 800 feet to 1 inch, $\frac{1}{9600}$ of nature showing the plan of all the mines and the shape of the floor of the Mammoth Bed, where mined, and its most probable structure in undeveloped areas, by contour curve lines, 50 feet vertically apart.

1. No. I, Delano sheet, between Delano and Mahanoy City, in Schuylkill county.
2. No. II, Shenandoah sheet, between Mahanoy City, Shenandoah, and Gilberton, in Schuylkill county.
3. No. III, Girardville sheet, in vicinity of Frackville and Girardville, in Schuylkill and Columbia counties.
4. No. IV, Ashland sheet, in vicinity of Ashland, Locust Dale, Centralia and Montana, in Schuylkill, Columbia and Northumberland counties.

Three Topographical sheets, scale 1600 feet to one inch, $\frac{1}{19200}$ of nature, showing the topography of the surface by contour curve lines 10 feet vertically apart.

5. No. I, Mahanoy City and Delano sheet, in the vicinity of Quakake Junction, Delano and Mahanoy City, in Schuylkill county; embraces the area on Mine sheet No. I.
6. No. II, Shenandoah and Girardville sheet, in the vicinity of Mahanoy City, Shenandoah, Frackville and Girardville in Schuylkill and Columbia counties; embraces area on Mine sheets Nos. II and III.

7. No. III, Ashland and Mt. Carmel sheet, in the vicinity of Ashland, Locust Dale, Centralia, Montana and Mt. Carmel, in Schuylkill, Columbia and Northumberland counties; embraces area on Mine sheet Nos. IV and V.

Four Cross Section sheets, containing vertical cross sections exhibiting the geological structure of the coal-beds. Scale of sections, 400 feet to 1 inch, $\frac{1}{4800}$ of nature.

8. No. I sheet contains 4 sections between East Mahanoy tunnel and Mahanoy City.

9. No. II sheet contains 5 sections between Mahanoy City and Mahanoy Plane.

10. No. III sheet contains 4 sections between Mahanoy Plane and Girardville.

11. No. IV sheet contains 2 detail and 11 skeleton sections between East Mahanoy tunnel and Locust Dale.

Mine sheet No. I was commenced in November 1881, and Nos. I, II, III and IV, finally printed in October, 1883. No. V was printed December, 1886, while VI, VII and VIII are still in the hands of the state printer. They are all based on the maps and surveys of the coal operating companies in combination with those of the Geological Survey.

In August and September, 1881, Prof. C. L. Doolittle determined the longitude and latitude of the court houses in Pottsville, Schuylkill county, and Wilkes Barre, Luzerne county, and established the true meridan in each locality. This meridan was carried by a survey made by the Geological Survey corps from the geodetic point at Pottsville, to what is known as the Gilberton tangent on the Philadelphia and Reading railroad and from this tangent, throughout the field. From this survey the true meridan and a rigid base for the Western Middle sheets was established.

In their construction the colliery maps of the operating companies, and individuals were connected by the survey with the base map and these together with information obtained from various sources, were added until the sheets were completed. The Philadelphia and Reading Coal and Iron Company, controlling by far the greatest proportion of the territory embraced by these mine sheets, have in their possession connected maps on a scale of 300 feet to the inch, showing all their properties. This scale was adopted by the survey in the construction of their "working sheets," as saving the labor and time which would have been necessary in the reduction of the Coal and Iron Company's maps to a different scale. The maps of the other companies and of individuals which were placed in the hands of the survey, were in different stages of completion and made on a great variety of scales. These were all reduced to the scale of the base map (300 feet to 1 inch) and added to it.

It required a great amount of field work by the Geological Survey corps to establish a proper connection between the base map and the mine maps and surveys of the operators. In addition to this, many surveys and examinations were necessary to determine outcrops and establish certain geological conclusions in the construction of the sheets. These surveys included not only surface examination, but also a great amount of detailed underground work.

After the completion of the sheets on the scale of 300′ to one inch, they were sent to the engraver and there reduced to the scale of 800 feet per inch, on which scale they were finally printed. They show the property lines, streams, railroads, wagon roads, town plots, colliery buildings and other surface features, also the horizontal projection of all the mine workings in the coal-beds of the several collieries, together with contour lines drawn 50 feet vertically apart on the floor of the bottom member of the Mammoth bed, showing its actual position in worked areas, and also its most probable structure in the areas which have been undeveloped.

Since the publication of the Annual Report for 1885, the field and office work on 4 additional mine and geological sheets Nos. V, VI, VII and VIII have been completed. They are as follows:

No. V. Mt. Carmel sheet extending from the county line between Columbia and Northumberland counties, east of Mt. Carmel, to about 17000 feet west of that town.

No. VI. Shamokin sheet extending from 17000 feet west from the town of Mt. Carmel to Shamokin, Northumberland county.

No. VII. Bear Valley sheet, extending from Shamokin, Northumberland county, west for 23000 feet.

No. VIII. Trevorton sheet joins sheet No. VII on the west, and extends to about 10000 feet west of Trevorton gap.

Of these, the edition of No. V has been printed. The others are at present in the hands of the printer, and will soon be ready for distribution. In additition to these 4 geological sheets, 7 additional cross sections exhibiting the geological structure of the coal-beds have been made. These, together with the sheets containing columnar sections of the coal measures cut in shafts, tunnels and bore holes, together with those compiled from actual colliery workings and surface exposures, within the area embraced by the mine and geological sheets will form Part II of the Atlas.

The Western Middle Coal-field Atlas, Part I, was incomplete from the fact that it contained no columnar section sheets exhibiting the position and character of the coal-beds or of the rocks between them. The columnar section sheets which will be contained in part II of the Atlas, will include not only columnar sections embraced by Mine sheet Nos. V, VI, VII, VIII, but also those within the areas embraced by sheets I, II, III, and IV, and the general plan used in representing the topographical, geological and mining features on these sheets is the same as that already shown on those to the east with the exception of the conventional used in representing colliery gangways, airways and breasts. These on sheets V, VI, VII and VIII are shown in the same detail as on the working maps of the operating companies.

Drainage.

The surface drainage of the Western Middle Field is very simple. Pine creek drains quite a limited coal measure area in the vicinity of Delano, Schuylkill county. This creek empties into the Little Schuylkill, two-and-a-half miles above the town of Tamaqua. With this one exception, the area of the Western Middle Coal Field is drained by the Mahanoy and Shamokin creeks into the Susquehanna river. The Mahanoy creek rises 2000 feet, more or less, south of the town of Delano, and flows east until it reaches the town of Ashland. Its course is through the Mahanoy basin proper, its feeders coming in from the adjoining local basins to the north. At Ashland this creek breaks through the Mahanoy mountain, and from this gap west to the Susquehanna river, flows through the Mauch Chunk red shale and underlying rocks. East of Ashland its tributaries rise and flow almost entirely within the coal measures. They include the north branch of Mahanoy creek, Waste House run, Shenandoah creek, and Big Mine run. West of Ashland the only coal measure stream, the waters of which reach the Mahanoy creek, is that of Big run. This, like the main creek itself, breaks through the Mahanoy mountain and both unite in the red shale valley to the south. West of Ashland, with the exception of Big run, the drainage of the coal basin is towards the west. Excepting a very small portion of the basin in the vicinity of Treverton, the water of all the streams finds its way into Shamokin creek. The main branch of Shamokin creek has its source just west of the town of Centralia. It flows east through Mount Carmel and Shamokin, breaks through the Cameron Gap north of the latter town, and from here flows through strata under-lying the coal measures and empties into the Susquehanna at Sunbury. The extreme western portion of the coal field is drained by Zerbe's run which breaks north through the Big mountain and continuing its course west through the Mauch Chunk red shale enters the Mahanoy creek near Hunter's Station, in Northumberland county. There are three well marked water sheds within this area. One near Centralia, Columbia county, the eastern slope of which is drained by Big Mine run, and the western slope by the middle branch of the Shamokin creek. Another east of Locust Summit, the eastern slope of which is drained by the waters of Big Mine run, and the western slope by the Locust creek. The third, and least important

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of these water sheds, is that which separates the waters of Zerbe's run from those of Carbon run which flow east into the Shamokin creek.

Although producing very heavy grades none of these water shed summits are of sufficient height to prevent their being crossed by the various railroad systems of the basin. The railroad grades are therefore very often adverse to trade, while the different railroad systems, in many portions of the field, are not separated by the topographical features of the region but are seen climbing the summits in almost parellel lines. The eastern boundary of Sheet 1 is a quarter of a mile east of the town of Delano, Schuylkill county. From this point the sheets extend westward for the entire length of the basin. The western edge of Mine sheet No. VIII being 2 miles west of Treverton, Northumberland county. The sheets have been so arranged that their north and south borders are continuous straight lines including the greatest coal area possible.

Within this area there have been developed sixteen separate workable coal beds. The following list will show their geological order and their local naming:

Little Tracy Bed No. xvii.
Big Tracy Bed No. xvi.
Little Diamond Bed No. xv.
Diamond Bed No. xiv.
Little Orchard Bed No. xiii.
Orchard Bed No. xii.
Primrose Bed No. xi.
Holmes Bed No. x.
Top Split Mammoth Bed No. ix.
Middle Split Mammoth Bed.
Bottom Split Mammoth Bed No. viii.
Skidmore Bed No. vii.
Seven Foot Bed No. vi.
Buck Mountain Bed No. v.
Upper Lykens Valley Bed.
Lower Lykens Valley Bed.

The characteristics of these beds are so varied in different parts of the field that it is difficult to define their thickness and relationship in a general way. A detailed knowledge of the individual beds however may be obtained by a study of the mine and section sheets.

East of Delano a very small portion of the Mahanoy basin extends beyond the boundaries of the sheet. It includes limited areas of the Buck Mountain and Lykens Valley coal beds. The eastern limit of the former bed is within a few hundred feet of the sheet line, while the outcrop of the Lykens Valley bed extends for a distance of a mile beyond the border of Sheet No. I.

On the south side of Sheets Nos. I and II is the New Boston basin which extends south beyond the limits of those sheets. As much of this basin however, as is included on the sheets has been carefully mapped. The remainder will be published on future sheets to the south which will include the coal measures of this and other basins along the Broad Mountain. On the north sides of sheets II, III, IV, V, VI, and VII the coal measures extend at various points beyond the limits of the sheets. The sheet line in some places cutting through the workings of important collieries. The workings of these collieries have all been carefully mapped to the edge of the sheet. Their remaining portions will be mapped when a new series of sheets, north of the present ones, shall have been completed. West of the western edge of sheet No. VIII there extends an area underlaid by the Lykens Valley bed. This has been mapped on a portion of Mine sheet VIII, and has also its connection with the rest of the basin shown.

There are four distinct outcrops on these sheets which the Survey has attempted to especially define, they are; the parting between the Mauch Chunk red shale, No. XI and the Pottsville conglomerate, No. XII; the outcrop of the Lykens Valley bed (the lowest coal bed in the series); the outcrop of the Buck Mountain bed which is underlaid by "the Buck Mountain rock," a large egg conglomerate, which is locally considered a key rock in the study of geology of these and neighboring basins; and lastly the outcrop of the Mammoth bed. The parting between No. XI and No. XII is clearly shown at all points on the sheets, either by its actual exposure or by the topographical features which in this section of the State always accompany it.

The outcrop of the Lykens Valley bed has been located at all points excepting along the main ridge of the anticlinal just north of Centralia, Columbia Co., where it was impossible to obtain sufficient data to warrant the location of this outcrop with any assumption of accuracy.

The location of the Buck Mountain bed is shown on all the sheets except in the vicinity of Raven Run northeast of Girardville, Schuylkill county. At this point, owing to the confusion of underground dips and the lack of surface indications, an accurate location of this outcrop was impossible.

The Mammoth bed outcrop was located largely by actual developments in the colliery workings.

Of the three coal beds whose outcrops are specially defined the Lykens Valley is the one least worked. There are four collieries in this field, which have been dependent upon the Lykens Valley coal bed for their production, namely: The Helfenstein, Ben Franklin, Gordon and North Franklin collieries. Aside from these workings and a few small drifts in the vicinity of Montana, Columbia County, the outcrop of this bed has been proven only in trial shafts scattered along the entire length of the basin. This bed, however, occurring as it does in the hard unyielding measures of the Pottsville conglomerate, while often not showing the slightest exposure, can almost always be approximately located by the occurrence of the conglomerate cliff, which its outcrop generally occupies.

The Buck Mountain bed has been more or less extensively worked on each of the sheets. In addition to this it has been trial shafted in many places, and resting on so marked a horizon as the Buck Mountain rock, its position is readily recognized.

The most extensive mine workings on the sheet are those in the Mammoth coal bed, these of course locate the outcrop of the Mammoth wherever worked. While in the undeveloped portions trial shafts and surface indications have been used in defining the outcrop and structure of the bed, much time and labor was spent in contouring its floor. The study of this structure required the collection of much data and the compilation of the same after its collection. The Mammoth bed, which is the one most sought for by mining prospectors and the one most extensively worked, was especially chosen to illustrate the structure and local features of the basin, because it is the most important bed in the series. This is eminently true in a commercial sense, but in addition to its well recognized features, which make its identity comparatively easy, the extent of its mining and its geological position gives it an importance which demands a recognition greater than that of any other horizon on the sheet.

In addition to these outcrops, which have been especially defined, are the outcrops of the several other beds above and below the Mammoth. The outcrop of these beds have only been marked on the sheets where developed by actual mine working. In all cases where the outcrops have been actually located, they are represented on the sheets by a full line in the conventional belonging to the bed which they represent. In places where only the probable location can be shown, the same conventional color with a broken line is used. On the edge of the sheet is printed a scale, on which the conventional color or line for each bed is shown; with the exception of names, tunnels and faults all the material, printed in black on the sheets, refers to surface features only. There has been constructed 18 cross sections which cross the sheets at right angles to the strike of the measures. The position of each of these sections is shown on the mine sheets by a full blue line, to which is added the number of the section.

While the same series of coal beds are worked on all the mine sheets and under somewhat similar conditions, there is sufficient difference in the character and thickness of the beds in different parts of the field, to warrant a description of each mine sheet separately. While this is necessary in a general sense, in the study of individual coal beds and individual colliery openings, an intelligent understanding of

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the connected structure of the basin is impossible without the consideration of all the sheets collectively.

While there is no point within the borders of the Western Middle coal field where the parting between the Mauch Chunk Red shale, No. XI and the Pottsville conglomerate, No. XII, rises to the surface to make a distinctly separate coal basin, yet there are many prominent basins and, anticlinals which modify the interior dips of the basins and materially effect the character and position of the mine workings. The completion of the sheets covering the entire length of the field, enable us to very accurately trace the more prominent axes along their entire length.

In the description of the location, extent and general structure of the basins and anticlinals of the field, it will be noted that the structure of the Mammoth bed is more prominently considered than that of any other. This occurs from the fact of a closer study having been made of its especial features in the contouring of the floor of that bed. A comparison of the Columnar sections which occur on each sheet with these contour curve lines will readily show the depth and position of the several beds above and below the Mammoth and will consequently give a clear idea of the general features of the basins in connection with these beds.

Mahanoy basin.

The most prominent of these flexures and the one from which the field is frequently named, and which has held so prominent a part in the coal production of this area is the Mahanoy basin.

East of the eastern edge of Mine sheet No. I the lowest coal measures of this basin are gradually lifted to the surface. The basin narrowing in its progress east causes the outcrop of the Buck Mountain and Lykens Valley coal beds and the top of the Mauch Chunk red shale to swing round the extreme end of the basin in their geological succession. In their progress east, all the coal measures above the Buck mountain bed have been lifted to day before reaching the eastern edge of Sheet No. I.

At the edge of Mine sheet No. I the outcrop of the Buck Mountain bed shows two district basins separated by a prominent anticlinal, the more southern of the two is the Mahanoy basin proper. 2300 feet east of the East Mahanoy tunnel of the Philadelphia and Reading Railroad is the extreme eastern outcrop of the Mammoth coal bed in the Mahanoy basin. Its elevation here is 1450 feet above tide. From this point it rapidly falls until under the town of Mahanoy City its probable elevation is 650 feet above tide. Further west, in the vicinity of the town of Ashland, the elevation of the bottom of the basin is about 1450 feet below tide. This is considered the lowest point at which the Mammoth coal bed is to be found in the Western Middle field. the difference in elevation from the surface being about 2300 feet, and from the southern outcrop over 2500 feet. From this point there is a general rise of the basin towards the west.

The developments of the Mahanoy basin prove that its rise and fall along its axial line is not gradual, but on the contrary, more or less irregular. The extreme western outcrop of the Mammoth bed in the Mahanoy basin is found north of the workings of the Ben Franklin colliery. about 6700 feet west of the eastern edge of Mine sheet No. VI. The elevation of the western outcrop, where it turns. in conforming to the dips of the basin, is 1500 feet above tide, very nearly the same as that of the extreme eastern outcrop.

The most marked feature of this basin is its steep regular north dips. The south dips are somewhat flatter than the north dips and are also very regular. The difference, however, between the two sides of the basin exists in the fact that while on the north side the dips are broken by a number of axes, entering the main basin from the northeast and northwest, the south side, with the exception of the break made by the expiring Locust Mountain anticlinal north of Gowen City on Sheet VI, is one unbroken monoclinal dip.

Much of the early mining in the Western Middle field was done in this basin, and to-day along the north dip, from a point 9600 feet west from the basin's extreme eastern end west for a distance of 15 miles, there is an almost unbroken line of colliery workings, while on the south dip of the basin connected workings extend 4 miles further west. The bottom of this basin has recently been cut at the Lawrence colliery near Mahanoy Plane.

Such an event naturally suggests thoughts of the basins exhaustion. A little study of the contour lines in connection with the elevations of the outcrop and the bottom of the basin, together with the proportion of undeveloped area to that already mined, will show the future possibilities of this basin as a great producer from the Mammoth bed alone.

New Boston basin.

South of the Mahanoy basin and along the Broad mountain is the New Boston basin. This basin has been opened by the Middle Lehigh colliery. On sheets I and II the workings of this colliery are shown. Owing to the dimensions of the sheet, it is impossible to show the size and character of the entire basin. No contouring has been done to show the structure of the Mammoth coal bed, but a later publication will consider the New Boston and other Broad Mountain basins in their entirety and a future atlas will contain maps covering the area between the Mahanoy and Pottsville basins.

Separating the New Boston basin from the Mahanoy basin is a well defined anticlinal of the Pottsville conglomerate. The eastern outcrop of the Lykens Valley bed in the New Boston basin is shown about half a mile southeast of the southern mouth of the East Mahanoy railroad tunnel. Its extreme western outcrop is south of the southern edge of the sheets. The bed most worked in the New Boston basin is the Buck mountain. In addition to this bed the Seven Foot, Skidmore and both splits of the Mammoth are worked.

Middle Mahanoy basin.

Just north of the eastern extremity of the Mahanoy basin is that known as the Middle Mahanoy basin, the an-anticlinal separating these two basins brings the Mammoth to the surface at the Beaver Run colliery. Just west of this point at the Morris colliery the Buck Mountain bed is developed on both dips of the anticlinal. Near the outcrop of the Mammoth bed where it turns round this anticlinal, a local basin sets in which, though limited in extent, has a material effect in changing the shape of the contours.

The Mammoth bed at the extreme eastern end of the Middle Mahanoy basin, half a mile east of Beaver Run breaker, outcrops at an elevation of 1500 feet above tide; this basin falls rapidly west until at the Primrose colliery it is 900 feet above tide, the basin from here again rises until 1000 feet south of the Glendon colliery, an elevation of 950 feet above tide is reached, here it again falls reaching its lowest depth (650 feet above tide,) between Mahanoy City and Suffolk collieries, from here again rising it is lost in the Suffolk colliery workings on the north slope of the Ellangowan basin.

Ellangowan basin.

The dips of this basin are somewhat irregular, varying greatly in their amount. The basin, however, is marked as a specially productive and economical one to mine.

The Ellangowan basin proper which is now being very extensively developed in the mine workings of the Ellangowan colliery of the Philadelphia and Reading Coal and Iron Company, and from which a large and profitable production is anticipated, is of limited length. To the east, the more southern of the two synclinals into which it is divided, is lost in the mine workings of the Mahanoy City colliery, while its western end, at the line between Mahanoy and West Mahanoy townships, is lost in the inverted dips of the Bear Ridge overturn. The greatest approximate depth which the Mammoth bed in this basin reaches, is 300 feet above tide; its dips are generally flat and very favorable to successful mining.

The northern spur of the Ellangowan basin extends east of the Ellangowan breaker for a mile and three-quarters, finally disappearing in the workings of the West Lehigh colliery. The Ellangowan basin proper, together with its northern spur, have not been as extensively worked as the several basins which surround them. Recent colliery openings, however, have been made. tending to the development of these basins, which will add much to the available tonnage of the Mahanoy region.

Shenandoah basin.

Still north of the Ellangowan basin is the Shenandoah basin, this basin is developed in the workings of the Mammoth bed, from the Packer No. 2 colliery, east to beyond the West Lehigh colliery, a distance of almost 7 miles. It includes within these limits the Lehigh Valley Coal Company's Packer collieries, as well as the Kohinoor, West Shenandoah, Kehley Run, Plank Ridge, Indian Ridge, Knickerbocker and West Lehigh collieries, all of which are noted in the trade for their extensive production and their record of profitable mining. The dips of this basin are more or less broken by local anticlinals and synclinals, the most important of which is the Shenandoah overturn. The Shenandoah and Bear ridge overturns are described in another portion of this report, (see page 987).

East of the West Lehigh breaker, 3000 feet or more, the Mammoth coal bed outcrops along the axial line of the Shenandoah basin. The basin continues to the east beyond the limits of the sheet. Its north and south dips are developed in the Meyersville and Pine Creek collieries in the Buck Mountain bed. The rise of the basin, however. is not sufficiently rapid to bring the outcrop of this bed to daylight within the limit of the sheet, at the point where it turns round the end of the basin. On this sheet the western end of the basin in the Mammoth bed is lost in the south dip workings of the Packer No. 2 colliery.

William Penn basin.

Beginning at the Turkey Run colliery, and running west is the William Penn basin. The extreme eastern outcrop of the Mammoth bed is shown at an elevation of 1200 feet above tide. The basin rapidly falls to the west until under the town of Girardville it reaches its maximum depth, 600 feet below tide, from here it again rises regularily west, until 1000 feet east of the Bast Colliery slope it has reached an elevation of 300 feet above tide; from here it falls rapidly west, and is at once lost in the confused dips at the eastern end of the Germantown overturn.

Girardville basin.

South of the William Penn basin is another of lesser depth, first observed in the mine workings of Packer No. I colliery. It is called the Girardville basin, and falls rapidly west, and for a distance of 6000 feet from its intersection with the Packer colliery east gangway, where it is first observed, its course is almost parallel to that gangway. Under the town of Girardville, however, it swings to the south, and finally near the eastern line of the town of Ashland joins the main Mahanoy basin. The fall of this basin is continuous and very rapid; it is almost entirely undeveloped, so that a location of its depth and position is necessarily largely hypothetical. The shaft workings of the New Packer No. 5 colliery of the Lehigh Valley Coal Company will add much information of value in the development of this basin, and that of the William Penn basin to the north.

Centralia basin.

Separated from these basins by the broad, flat Locust Mountain anticlinal, is the Centralia basin, the outcrop of the bottom coal measures of which form such a prominent spur north of the outcrop of the main basins.

The Lykens Valley coal bed along this spur has been developed only by occasional shaftings. East of the village of Raven Run there are no workings in any of the coal beds, but west of this point the workings in this basin are continuous to one mile beyond the town of Centralia. The eastern limit of the Mammoth coal bed is about 2000 feet east of the junction of Butler, West Mahanoy and Union townships, Schuylkill county. The deepest point of the basin is at the Continental colliery, where a depth of 800 feet above tide is reached.

West of this, however, the rise of the basin is very irregular. Its final western outcrop of the Mammoth bed, however, is reached 2 miles west of the town of Centralia, along the south branch of Shamokin creek. Future developments may prove the location of this outcrop to be incorrect. The location shown on the sheets was made from the best information extant, but was not sufficiently exact to establish a positive conclusion. At the Locust Run colliery, just north of the town of Ashland, the eastern end of the Germantown basin is developed in the Mammoth gangway, at the foot of the slope. It falls very slowly to the village of Germantown, where it reaches its greatest depth. From here it again rises to the east, until it is lost in the overturn dips at the Merriam colliery.

Coal Ridge or Montana basin.

North of the town of Centralia the workings of the Reno and Monroe collieries have developed the Coal ridge or Montana basin which extends northeast in a spur similar to that of the Centralia basin. East of Ravens Run the Lykens Valley bed has been opened along its outcrop and consequently lowest coal measures are well defined. The extreme eastern outcrop of the Mammoth bed is about half a mile east of the Reno colliery. The basin at its extreme eastern point is divided into two parts. The association of these two basins is so intimate that they have received the same name, the additional distinction being made by calling the southern one No. 1 and the northern No. 2. The southern or No. 1 basin falls very regularly and rapidly to a point just north of the Mt. Carmel colliery.

From this point for a short distance there is a slight rise in the bottom of the basin quickly followed by a gradual fall to a point south of the Pennsylvania colliery where the basin reaches its greatest depth in this vicinity, 400 feet above tide; from here it rises more or less irregularly until all traces of it are lost in the eastern workings of the Excelsior colliery. The northern Coal Ridge or Montana basin is that known as No. 2. Its course is parallel to that of No. 1 until the line between Columbia and Northumberland counties on Mine sheet No. V is reached. Here, by the flattening of the Pennsylvania anticlinal which separates these two basins, its course is materially changed, at one place in the vicinity of Green ridge running due east. West of this point it swings gradually to the south passing under the town of Shamokin, bearing south 72° 30′ west. The elevation of the bottom of this basin is very irregular. Its fall from its eastern outcrop is west to the town of Mt. Carmel where it reaches an elevation of 100 feet above tide, from here it again rises to the Pennsylvania colliery, but developments at the foot of Pennsylvania slope No. 3 show that it falls towards the west. Near the western extremity of the Pennsylvania workings, it again rises to a point several hundred feet west of the eastern edge of Mine sheet No. VI, from here, however, the fall is regular and rapid across the width of Mine sheet No. VI to the western portion of Shamokin. Here it reaches an elevation of 800 feet below tide. From this point the dips are lost under the cover of surface wash, in the thickly wooded areas from this point west. The basin, in all probability, falls till it meets the Treverton basins when it gradually rises towards the extreme western outcrop of the Western Middle field. West of the Pennsylvania colliery the Coal Ridge or Montana basin is known as the Pennsylvania basin.

It will be noted that the Coal Ridge or Montana basin and the Mt. Carmel basin, the eastern ends of which are seen on these sheets are those which falling rapidly to the west attain, from their great depth and the number of coal beds which they contain, so great a commercial importance in the vicinity of Shamokin.

To the north of the Pennsylvania basin on Mine sheet No. V a portion of the Black Diamond basin is shown, the position of this basin has been determined largely by surface dips. it was debated for some time whether it was not a spur of the Pennsylvania basin instead of a separate one, the question depending on the existence of the anticinal, which the mine sheets show as separating them. ' A careful consideration of the surface dips led the survey to the conclusion that the structure shown on the sheets is the accurate one.

South of the Pennsylvania basin (Montana No. 1), the workings of the Pennsylvania colliery have developed another basin, the Quaker Run, which is of considerable importance. Its course is almost parallel to that of the Pennsylvania basin ; its fall is very regular and is continuous from its eastern origin west beyond the town of Shamokin.

Mt. Carmel basin.

The Centralia basin, already noticed as rising rapidly and bringing the basin in the Mammoth bed to the surface west of the Logan colliery, again falls to the west, producing what is known as the Mt. Carmel basin. The character of these two basins is very different, the dips of the Mt. Carmel basin being the flatter. Its most eastern development in the Mammoth bed is in the Mt. Carmel colliery of Thomas M. Righter & Co.

Its fall from here to the west is very rapid reaching its maximum depth of half a mile north of Mt. Carmel shaft colliery, from here it rises west and is finally lost in the north dipping measures of the Excelsior colliery. Its north dip is developed by the Mt. Carmel Shaft and Reliance collieries. Its south dips in the Mammoth bed do not rise to the surface and are as yet undeveloped.

Mt. Carmel Shaft basin.

The Mt. Carmel shaft basin, which is now being extensively mined by the Mt. Carmel shaft colliery, has its eastern developments in that colliery, while its western end is lost in the confused dips, developed by the Excelsior colliery.

Big Mountain basin.

At the Continental and Excelsior collieries still another basin is developed, the presence and location of which is also shown to the west, in the workings of the Big Mountain colliery. Its dips are sharp and well-defined. It is very narrow, falls rapidly west and is lost in the comparatively unexplored country between Shamokin and Trevorton.

Enterprise basin.

Still another basin is developed by the workings of the Enterprise colliery, which has its greatest depth at the western end of the Enterprise workings. Contrary to the other basins in the immediate neighborhood it rises to the west, the Mammoth outcrop at its extreme western end reaching daylight just south of the Burnside tunnel.

West of the town of Shamokin the coal measures are hidden by a deposit of wash on which there is a heavy growth of timber and underbrush. The exposures are very few and over very extended areas, there are no actual mining developments.

Between Shamokin and Trevorton there are several lines of shafting in which the outcrops only of the coal beds have been developed. Without mining development in this area it is impossible to accurately trace the direction and character of the anticlinal and synclinal folds. Near Trevorton the colliery workings have been opened quite extensively, but east of these for several miles the character of the flexures are undetermined. In the Treverton collieries two marked synclinal troughs are shown and are also proven in the outcrop of the lowest coal measures to the west. The outcrop of the Lykens Valley bed and the boundary of the limits of these measures is proven by continuous shaftings along the outcrop.

In addition to the basins which have been described there are many others in different parts of the field which are more purely of local interest ; these latter have little effect in shaping the general character of the geology of the field, but their local importance in the development and profitable management of single collieries is very marked.

The probable exhaustion of the Western Middle field is a question of frequent discussion. Many of the basins, both large and small, have been extensively worked and the coal exhausted over large areas. Aside from the consideration of the immense undeveloped areas in the Mahanoy and adjoining basins, which have already been extensively worked, there are many which are practically untouched, these in a large degree, emphasize the probability of a great future production.

Anticlinals.

East from the town of Frackville there extends the New Boston anticlinal which, bringing the Pottsville conglomerate to daylight, separates the New Boston from the main Mahanoy basin to the north. It is especially important as it brings all the coal bearing rocks to the surface, making a distinctly barren area between the two basins.

The anticlinal of greatest geological importance, in this field, is that of the Locust mountain. Near Raven Run, Schuylkill county, it first exposes the parting between No. XI and No. XII where the north and south dips meet on its crest; from here its elevation is quite irregular, although it at no point falls sufficiently to contain the outcrop of any coal bed geologically higher than the Buck mountain. Throughout its entire length it is a broad flat saddle, the dips of which show their marked regularity in the several gaps which are cut through it by the mountain streams. Its western limit in the coal measures is just north of Gowen City. Here it is the southern boundary of the coal measures of the Western Middle field, while at Raven Run it is on the opposite or northern sides. All the others on entering the field immediately fall and are rapidly covered by successively higher measures.

In addition to the Locust mountain anticlinal, and like it making well marked indentations in the boundary of the coal field, are the Mine Ridge, Red Ridge, Luke Fiddler and Trevorton anticlinals. These, together with the New Boston and Locust Mountain anticlinals, are the only ones which have a material effect in changing the direction of the coal fields boundaries. The other anticlinals, of which there are very many, while materially affecting the higher coal measures expire east or west along their courses in the regular north and south dips of the basin. Most of these anticlinals have a material effect in directing the course and shaping the character of the advancing colliery gangways. In many cases near the centre of the basin they bring to the surface and expose extended outcrops of important coal beds. Several of these anticlinals have developed important overturns. In many places through the field the inverted dips of these overturns are entirely unworkable. The most marked of these are the Bear Ridge, Shenandoah, Germantown and Locust Spring. A description of each is given in the description of the mine sheet on which it occurs.

Mine Sheet No. 1.

At least five-sixths of the area embraced by this sheet is covered by coal measures, and the remaining portion by the Manch Chunk red shale. With the exception of a very limited area in the vicinity of Delano (the drainage of which is east into Pine creek) the surface drainage of the coal measure areas embraced by this sheet is west through the branches of Mahanoy creek into the Susquehanna.

At the time the sheet was completed there were but two railroad outlets for the coal production of the collieries within this area. One of these is the Mahanoy division of the Lehigh Valley Railroad; the other, the Philadelphia & Reading Railroad, which runs through the East Mahanoy tunnel. This tunnel, cutting as it does, through the lower coal beds down into the Mauch Chunk Red Shale was taken advantage of by the Survey in obtaining the facts necessary in the construction of a columnar section of the rocks which underlie this coal field.

Since the completion of the sheet the Pottsville and Mahanoy division of the Pennsylvania Railroad has not only been connected with that of the Lehigh Valley at New Boston, but branch lines have also been constructed into the towns of Shenandoah and Mahanoy city. The advantage of the presence of these three competing lines is readily perceived.

The outcrop of the top of the Mauch Chunk red shale was placed on the sheet from a survey made by the geological survey corps. The outcrop of the Lykens Valley and the Buck mountain were located from the characteristics which are common to them and which we have already mentioned in their general description. The Skidmore and Seven Foot beds, which lie between the Mammoth and Buck mountain, are not defined by surface features or developed in colliery workings sufficiently to give an accurate location of their outcrop. They have been mined at the North Star, Webster, Hillside, Primrose, Coplay, Malvern, and other collieries on the sheets, so that if desired their outcrop may be approximately located by assuming their relative position to be the same on other portions of the sheet as at those which have been named. The same is equally true of the Primrose and Holmes beds which overlie the Mammoth.

In the immediate vicinity and north of the town of Mahanoy City the coal beds have been extensively mined. These colliery developments have very minutely proven the structure and contour of the several basins as well as adding much to a knowledge of the size and character of the coal beds. East of these collieries, however, while a knowledge of the general structure of the basins can be obtained from surface indications little has been done which leads us to a detailed knowledge of the character and condition of the beds.

This sheet is especially interesting as containing the extreme eastern outcrops of the Mammoth coal bed in the Western Middle field as well as showing the development of the lower coal measures along the several anticlinal and synclinal folds, which, on this sheet falling to the west so materially, effect the geological structure of the basin.

It is also interesting as showing the geological connection between the main Mahanoy and the New Boston basins, the latter of which is at present so little developed. There are eight distinct coal beds mined on this sheet, of these the Holmes bed, with a thickness of 10 feet, is not extensively worked. The Primrose, however, which is the next coal bed above the Holmes is very extensively worked in both the main and middle Mahanoy basins. Its average thickness is about 10 feet. The Holmes bed, on this and Sheet No. II, is frequently confused with the Primrose bed. Each bed has been mined at adjoining collieries and their identification seems very plain. The confusion in the nomenclature of these beds has arisen more probably from trade reasons than from any misunderstanding as to their relative geological position.

The Mammoth bed has been extensively worked in each of the several basins on the sheet. A thickness of 7 feet for the top split, 8 for the middle split and 5 for the bottom split is therefore merely a record proven by mining developments. What the thickness and character of the same beds may be on the undeveloped portions of the sheet, it is, of course, impossible to state, but from the fact of their retaining their thickness over extended developed areas leads to a confidence that the same thickness and character will be maintained over the undeveloped areas adjoining. Below the Mammoth bed is the Skidmore, 6 feet thick; the Seven Foot, 6 feet thick; and the Buck Mountain, 11 feet thick. All of these beds are worked in each of the several basins on the sheet. Their thicknesses vary more than any of the beds which overlie them. The thicknesses given, however, are the best averages which can be suggested for this area.

Below the Buck Mountain is the Lykens Valley bed, the lowest coal bed in the series, its thickness as cut in the East Mahanoy railroad tunnel is but 3 feet. What the average thickness of this bed is over the entire sheet it is very difficult to determine, from the fact, that no colliery openings have been made upon it, neither have their been developments made along its outcrop by exploring shafts. The fact of the Lykens Valley bed having its minimum thickness at the eastern end of the field, while in the Trevorton collieries on Mine sheet VIII, at the western end of the field, it reaches its maximum thickness, coincides with a similar feature in the Southern coal field. In the eastern end of the Southern field it is very exceptional to find the Lykens Valley bed of workable thickness, in fact, it is unknown in the colliery development of that portion of the region, but at the extreme western end of the Southern coal field it reaches its maximum thickness and condition. This thickening of the Lykens Valley bed near the western end of these two great basins is a point interesting in the study of the original deposition of this coal bed, not lessened by the commercial importance which the coal from this particular bed holds in competition with the other Anthracite coals known to the trade.

Mine Sheet No. II.

With the exception of a very small portion in its extreme southwestern corner Mine sheet No. II is covered with coal measures. This small portion outside of the coal measure is in the Mauch Chunk Red Shale. The Lykens Valley coal bed has been outlined on this sheet from surveys locating an exposure of its outcrop at several points. It is at no point opened by colliery workings. The Buck Mountain bed is worked to some extent and its outcrop determined largely from these workings.

The outcrop of the Mammoth bed is shown by actual mining developments at every point on the sheet where it reaches the surface. The Big Tracy, 4 feet thick, the Diamond, 7 feet thick, Little Orchard, 3 feet thick, and the Orchard, 11 feet thick, are found in the Ellangowan basin. All but the Little Orchard bed have been worked by water level drifts and from the developments in these drifts the above thicknesses were obtained. Between these beds and the Mammoth are the Primrose and Holmes, the former 8 feet thick and the latter 13 feet thick. The same confusion of nomenclature between the Primrose and Holmes which has already been mentioned in the description of Mine sheet No. I occurs on this sheet. The thickness of the Mammoth bed on this sheet is greater than that on sheet No. I the top split averaging 12 feet, the middle 8 feet, and the bottom 15 feet. The thickness of the slate also between the top and middle splits is here reduced from 80 to 40 feet. The Mammoth bed has been very extensively worked on this sheet, both in the Mahanoy basin, between Gilberton and Mahanoy City, and in the Shenandoah basin in the vicinity of the town of Shenandoah. There still remains, however, an extended area of Mammoth coal in the Mahanoy basin as well as in the Ellangowan basin and its northern spur. Some of the heaviest coal producing collieries in the region are to be found on this sheet. They are mainly located in the vicinity of Shenandoah, and almost the entire production of these collieries is mined from the Mammoth bed. In addition to the Mammoth bed the Skidmore 4 feet thick, The Seven Foot 7 feet thick, and the Buck Mountain 12 feet thick have also been worked over limited areas. The most marked difference in the workings shown on Mine sheets Nos. I and II is that on mine sheet No. I, the Mammoth and the beds beneath it are the ones most extensively worked; while on sheet No. II which adjoins No. I on the west, the Mammoth and the beds above are extensively worked and the workings in those below the Mammoth comparatively limited.

There is probably no area in the Anthracite region which contains so much that is interesting in structural geology as that embraced by mine sheet No. II. The coal has been mined and the colliery workings advanced to such an extent that even the local secondary rolls of the several basins have been generally developed.

The most marked feature in the geology of the sheet is the presence of the Shenandoah and Bear Ridge overturns. The former is first observed in the workings of the Knickerbocker and Ellangowan collieries. In these workings as well as those of the Yatesville colliery there are developed a number of local rolls of greater or less extent which form secondary folds in the Shenandoah basin. Extending towards the west these folds become sharper, their dips steepen and they are brought very closely together. At the western end of the highest lift gangway in the Mammoth bed, of the Ellangowan colliery, it encounters a very sharp anticlinal and swings round on to its north dip. From this point west for a distance of four miles the north dip of the Shenandoah basin is overturned.

At the Ellangowan colliery at a point which we have already mentioned, the overturn dips are perpendicular or nearly so, but continuing to the west the overturn is more marked, at many places being paralled to the regular south dip of the Shenandoah basin.

Along its entire course the horizons containing both dips of the Mammoth bed are exposed on the crest of the overturned anticlinal. At many points, more especially at its eastern end, it is impossible to find the outcrop of the Mammoth bed along the overturned dip, in fact, between the Ellangowan and Knickerbocker collieries there has been little coal discovered between the outcrop of the Buck Mountain on the south dip of the Ellangowan basin, and that of the Holmes bed on the perpendicular north dip of the Shenandoah basin. Towards the western end of this overturned anticlinal, the dips of the overturn, while showing a greater overlap, do not show the same pinching of the measures, and in the vicinity of Packer colliery No. 3, the outcrop of the Mammoth on the overturned dip is exposed at several points.

This overturn crosses the western edge of Mine sheet No. II, and is entirely lost in the south dip workings of the Packer No. II colliery, located on Mine sheet No. III.

The dips of the Bear Ridge overturned anticlinal are equally well developed, its eastern portion being contained on this sheet. Its basin is a continuation of the Ellangowan basin to the west one of the marked characteristics of which is its extended flat dips. Unlike the Shenandoah anticlinal, approaching it from the east, the dips of the Ellangowan basin are unbroken by local folds, and retain their low dips to within a few hundred feet of the point where the overturn is developed.

This overturn is first seen just north of the old Furnace colliery, and from that point extends west along the south side of Bear Ridge. Like the Shenandoah overturn, the measures along the crest of the Bear Ridge overturn anticlinal have been eroded to below the Mammoth bed, thus exposing this horizon on both dips. This overturn differs from the Shenandoah overturn in the fact that its dips are the same for almost its entire length. It has the additional peculiar feature, rarely seen in the Anthracite coal measures, of exhibiting a parallelism between the north and south dips of one basin, and the south dip of an adjoining basin.

This is illustrated by the parallelism of the dips in both the Bear Ridge overturned basin, and in the south dip of the Mahanoy basin. An interpretation of the geological structure of this ridge, from surface features alone, would be impossible. The colliery workings, however, have made developments which have given us quite an accurate knowledge of the position of the coal measures in this disturbed area. Unlike the overturned dips of the Shenandoah anticlinal, those of this overturn are at no point workable.

This overturned dip continues west beyond the western limit of sheet II, where it is last seen at the town of Girardville.

Mine Sheet No. III.

On Mine sheet III, there are three areas about two thousand feet wide, which contain no coal. Two of these cross the entire width of the sheet, while the third along the Locust Mountain anticlinal crosses the sheet line from the east, and is barren of coal until it reaches the Raven Run colliery. This latter area is about eight thousand feet long and two thousand feet wide, and together with the other two strips of barren area is covered by Mauch Chunk red shale. The balance of the sheet is within the coal measures.

The outcrop of the Lykens Valley bed has been located on the sheet from general surface indications, and its associated topography. At no point on the sheet is this bed opened either by colliery workings or by trial shafts along its outcrops.

The Buck Mountain bed is worked at a number of points, but nowhere so extensively as in the vicinity of Raven Run; it has been worked at so many points, however, that its outcrop is thereby very accurately determined.

The outcrop of the Mammoth bed is developed on all parts of the sheet by the colliery workings. The beds which overlie the Mammoth are not extensively worked, in fact, with the exception of the Preston, Girard and William Penn collieries, the upper series of beds is untouched, although in one or two places where they have been cut in rock tunnels driven to develop other beds. Within the limits of the sheet there are no colliery workings on either the Big Tracy bed, which is 7 feet thick, the Diamond bed which is 4 feet thick, or on the Little Orchard bed which is 6 feet thick. These beds have only been proven in shaftings on different portions of the sheet and in rock tunnels, no workings have been opened upon them. The Orchard bed is opened at the Preston No. I colliery, where they have also worked the Holmes.

The Orchard bed here shows a thickness of 5 feet and the Holmes bed 10 feet. The Primrose is shown to be but 3 feet thick. This thickness for the Primrose is abnormal, and the positive identitification of both the Holmes and the Primrose may be questioned. On this sheet all the benches of the Mammoth are together making a bed the thickness of which will average 25 feet. The Mammoth on this sheet, as on all others, is very extensively mined, although from the nature of the dips of most of the basins the workings have not extended over so great a horizontal area as those on sheet No. II. There still remains an immense amount of Mammoth coal in the William Penn and Girardville basins and their secondary rolls, which is yet to be mined. The No. 5 shaft of the Lehigh Valley Coal Company at Girardville, which has been sunk since the completion of our sheets, will develop both of these important basins.

There is no mining on this sheet on the Skidmore and Seven Foot beds, from the fact that they have not usually been found of workable thickness. This condition is greatly in contrast to that of the same beds on sheet No. I, where each of them are extensively worked. The Buck Mountain, however, is found with an increased thickness; it is mined very little on the southern portion of the sheet, but on its northern portion, in the vicinity of Raven Run, and on the south dip north of the Connor, Hammond and Preston collieries, mine workings in this bed extend over very large areas. The thickness of the Buck Mountain over these areas averages 15 feet. The workings of the Girard Mammoth colliery not only developed the Buck Mountain bed along the center and on the sides of the Centralia basin, but has also extended its workings to the crest of the Locust Mountain anticlinal, where these workings are narrowly separated by the axis of the anticlinal from those of the Hammond colliery on the opposite dip.

It will be observed that the coal production of this sheet has come almost entirely from the Mammoth and Buck Mountain beds, the other beds being either entirely unworkable or mined over very limited areas.

The Bear Ridge overturn which has before been noted on Mine sheet No. II, continues west on Sheet III as far as the town of Girardville. It carries the same characteristics with it on this sheet as those which it held on Sheet II, both as to the condition of the coal beds found in the overturn, and in the parallelism of the several dips which we have already noted.

In the southwest corner of this sheet is located the Mahanoy plane, of the Philadelphia and Reading railroad which for many years has hoisted the coal from the Mahanoy valley to the top of the Broad mountain, from which point the grade steadily descends towards tide water. The difference of elevation between the top and bottom of the plane is 353 feet, the elevation of the top of the plane being 1484 feet A. T. It will also be noted that while all of sheets I and II, and a large portion of sheet III, are in Schuylkill county, the northwestern corner of sheet III is in Columbia county.

Mine Sheet No. IV.

The southern portion of this sheet is included within the borders of Schuylkill; its northern portion is in Columbia county while along its western edge there is a portion of limited extent which is included in Northumberland county.

This sheet is covered by coal measures with the exception of a very limited area along the crest of Mine Ridge in the northeast corner of the sheet and also an additional barren area along the Mahanoy mountain, near its southern edge. This latter area runs across the entire length of the sheet and is about 2000′ wide. Both these areas are in the Mauch Chunk red shale.

The workings of the Gordon colliery on the Lykens Valley bed, which extend over the borders of the sheet from the west, together with workings on the same bed of limited extent in the vicinity of Centralia and Montana, give the location of its outcrop very accurately in this particular neighborhood. Along its most southern outcrop it is easily located by its accompanying topography but along the south dip of the Mine Ridge anticlinal, just north of Centralia, anything more than an approximate location of its position is impracticable.

The Buck Mountain bed is worked at a number of points on the sheet. These colliery developments very accurately locate its outcrop. It is most extensively worked on the east and west sides of Mine run along the Locust mountain anticlinal, but west from this point as the anticlinal broadens there are neither workings nor shaftings along the outcrop by which to determine its position.

The Mammoth bed as on the other sheets to the east has its outcrop developed over almost the entire area of the sheet by the extended colliery workings which have developed its coal. There is an exception to this however, at the extreme western end of the Centralia basin where the deposit of wash along the south branch of Shamokin creek is so great that it is impossible to determine the outcrop of this bed.

A study of the geology of this sheet is interesting from the fact that in the vicinity of Ashland the Mahanoy basin is found of greater depth than at any other point in the Western Middle coal field. The great depth of the basin here is a very important point in the consideration of the exhaustion of the coal from this field. It is also here that the anticlinal, which to the east separates the Girardville from the Mahanoy basin disappears and to the west these two basins combine in one regular synclinal trough.

The Locust Mountain anticlinal, the dips of which are so prominent in the Buck Mountain bed on the eastern end of this sheet as well as on Mine sheet No. III, gradually broadens and flattens in its progress west. This is true to such an extent that, instead of containing extended areas of Buck Mountain coal with flat dips and general surroundings tending towards profitable mining, it contains quite an extended area underlaid by no coal above the Lykens Valley, which probably at no point rises to the surface. This bed has never been opened along the Locust Mountain anticlinal, and nothing therefore is known of its thickness or condition. The beds above the Mammoth are worked over limited areas.

In the Mahanoy basin, the Big Orchard 4′, the Primrose 8′ and the Holmes 5′, thick, have each been worked over limited areas. That these thicknesses will increase or decrease on other portions of the sheet it is impossible to determine. Except in the Coal Ridge basin the Mammoth bed occurs only as one bed and not separated into several splits as is frequently seen on the other sheets. Its thickness will probably average 25′. A bed said to be the Skidmore is opened on an overturn on Little Mine run. This is the only point on the sheet where this bed has been developed excepting in a rock tunnel at Logan colliery from which no gangways are driven. The Seven Foot bed is not generally recognized on the sheet though it may be represented by one of the several small leaders which occur between the Skidmore and Buck Mountain beds.

The Buck Mountain bed is worked at a number of points but most extensively along the Locust Mountain anticlinal south of the town of Centralia. West of Locust run on its south dip and west of Centralia on its north dip the workable thickness of the bed becomes questionable and from these points west we have little practical knowledge of the value of the bed.- On the other portion of the sheet its probable average thickness is about 10′.

One of the prominent geological features of the sheet is the Germantown Overturn anticlinal. This anticlinal is developed on Mine Sheet III as far east as the extreme eastern end of the Packer No. I colliery, from here it runs west under the town of Girardville separating the Girardville and William Penn basins. It reaches its lowest point at the eastern end of Girardville on Mine sheet II and rises with more or less regularity to the Bast colliery. Its dips continue very regular until within about 1,000′ of the Bast colliery underground tunnel where the several dips of the anticlinal steepen and before the tunnel is reached these dips become overturned. The top of the anticlinal is here also eroded so that the overturned dip in the Mammoth bed is exposed along its outcrop. From the Bast colliery tunnel west the overlap increases very rapidly.

At the Locust Run colliery the outcrop of the Mammoth bed on the overturned dip swings rapidly south and at Cleaver and Yocums colliery joins the regular south dip of the Mahanoy basin. The overturned dips continue towards the west, the top of the anticlinal in the Mammoth bed however being below the surface. The outcrop of the overturned dip in this bed, again shows at the old abandoned Cambrian colliery and continues west overlapped along its course until in this condition it crosses the western edge of Mine sheet No. V.

The Germantown overturned anticlinal is remarkable as producing a parallelism of dips like those of Bear ridge, between the south dips of the Germantown overturned basin, the north dips of the same basin (which are the overturned dips) and the south dips of the Mahanoy basin, making three of the dips of two separate basins parallel.

Mine Sheet No. V.

This sheet is known as the Mt. Carmel sheet. It extends from a point one-sixth of a mile east of the town of Mt. Carmel, Northumberland county, which is far enough east to include in its north-eastern corner the line between Northumberland and Columbia counties. Its western limit is about 17000 feet west of the town of Mt. Carmel. With the exception of a very small portion in its south-western corner the sheet is covered by coal measures areas. This small portion being underlaid by the Mauch Chunk red shale in the valley next south of Locust mountain. Mine sheet V embraces collieries which work the following coal beds: The Upper Member of the Lykens Valley or No. I, the Buck Mountain or No. V; The Seven Foot or No. VI; Skidmore or No. VII; the Lower Member of the Mammoth bed or No. VIII; the Upper Member of the Mammoth bed or No. IX; and the Holmes or No. X. The relative thickness and position of these beds together with that of the rocks between them is shown on the columnar section printed on the border of the sheet. The lower portion of the section, which includes several leaders of coal, too small for mining, was developed in the water level tunnel driven at the Gordon collieries in order to cut the Lykens Valley bed No. I, from which all the coal the colliery produced was taken. The middle portion of the section, including all the coal measures from the bottom of the Lykens Valley No. I to the bottom of the lower member of the Mammoth No. VIII, was taken from a cross section made by the engineers of the Philadelphia Coal and Iron Co. through the Helfenstein slope. The data for this section was obtained from the mine workings of the several collieries in the Mahanoy basin, as well as from trial shafts, which had been sunk on the outcrops of the unworked beds.

The upper portion of the section, which includes the coal measures from the Lower member of the Mammoth bed to the Primrose bed, was constructed from sections measured by the Geological Survey in the underground tunnels of the Pennsylvania colliery, and also from a trial shaft which exposed the outcrop of the Primrose bed No. XI. These beds are all of greater or less importance on different parts of the sheet. Those which on some parts of the sheet are most profitable to mine are at other points unworkable. This is due to the thickening and thining of the beds, and seems to be especially the case of the beds beneath the Mammoth.

The section, therefore, while giving the best possible illustration of the general structure of the coal measures embraced by this sheet can hardly be exhibited as a representative section of the entire area. The coal beds above and including the Mammoth show about the same thickness on all parts of the sheet. But this is not true of the beds below. In the Mahanoy basin the beds below the Mammoth have been developed by mine workings but in the basins to the north, notably the Mt. Carmel, Pennsylvania, and Black Diamonds basins such is not the case. In the Pennsylvania colliery on the north dip of the Pennsylvania basin, a tunnel has been driven which cuts the Seven Foot bed No. VI and the Skidmore bed No. VII. The section of coal bed No. VII measured in this tunnel shows:

Top, hard sandstone.		
Coal,	**0'**	**4"**
Bone,	**0'**	**2"**
Good coal,	**0**	**5"**
Shelly coal,	**0'**	**6"**
Bottom, hard slate.		
Total,	**1'**	**5"**

It was at the time impossible to obtain a section of bed No. VI as the entire exposure of the bed, which was cut on the axis of an anticlinal a few feet below the level of the tunnel, was entirely under water. There is no other point in the Pennsylvania, Black Diamond or Mt. Carmel basins on Mine sheet V, where the beds underlying the Mammoth have been developed in the mine workings. Bore holes in the vicinity of Mt. Carmel, however, show the thickness of these beds to be very much reduced.

These beds have been worked over so limited an area that it would be clearly unfair to present them as representative sections. There are, however, with the exception of the bore holes in the vicinity of Mt. Carmel, no other developments which would indicate their character and thickness.

The development of the Lykens Valley bed to so great an extent as that of the Helfenstein colliery is exceptional within the limits of the Western Middle coal field. The North Franklin collieries on Sheet VIII, the Ben Franklin colliery on the adjoining mine Sheet No. VI and the Gordon colliery also on Sheet V being the only other extensive colliery openings on this bed, outside the limits of the Lykens Valley district of Schuylkill and Dauphin counties.

Inquiry is often made as to the probable condition of the Lykens Valley bed in the undeveloped portions of the Western Middle field. This question is probably suggested by the developments on this bed on Sheet V which have no parallel on the four sheets of the series to the east. In the present state of mining development an opinion on the value of this bed, except where positively shown is largely a matter of conjecture.

On Sheet V the extent of the workings of the Helfenstein and Gordon collieries, together with the sections of the beds which were there developed, and the section cut in the Diamond drill bore holes at the Mt. Carmel colliery are the only data which at present give any information on this point. An average section of the Lykens Valley bed at the Helfenstein colliery is :

Rock top.		
Soft and shelly coal,	1′	0″
Slate,		5″
Coal good,	8′	5″
Rock bottom.		

and at the Gordon colliery is :

Rough coal,	2′	11″
Slate,	1′	0″
Coal,	5′	10″

The same bed was cut in the Diamond drill bore hole at the Mt. Carmel colliery, the record of which was given to the Survey by Mr. Thomas Righter, the indications are, however, that this hole was put down in confused dips and did not develop the bed at its normal thickness.

The upper member of the Lykens Valley bed No II has been developed at several points on Mine sheet No. V in trial shafts sunk on its outcrop. Its average thickness is two feet, so small that unless found in better development at some other point it need not be considered among the workable beds of the sheet for many years to come.

The position and thickness of the Buck Mountain bed on this sheet has only been determined by trial shafts along its outcrop. Recent developments have been made by series of trial shafts along the Red Ridge anticlinal in the northwest corner of Sheet IV. These explorations while they do not extend as far west as Sheet V indicate that both dips of the Buck Mountain bed outcrop on this sheet. Along this anticlinal an attempt was made to locate the crop, but without the aid of trial shafts it was considered impracticable. The thickness of the Buck Mountain bed in the shaftings referred to on the western border of Sheet IV is 6 feet.

The Skidmore bed is developed and quite extensively worked in the Merriam, Monitor and Locust Spring collieries of the Philadelphia and Reading Coal and Iron Company in the Mahanoy basin. The fact that they are profitably mined is indicated by the extent of the workings.

The identity of this lower bed is somewhat confused with that of the Mammoth. The Mammoth bed, the lower split of which is No. VIII and the upper split No. IX, exhibits on this sheet to a very great degree a marked characteristic which is seen in many parts of the Anthracite Coal Fields, viz: The separation of the several benches into separate and distinct coal beds with intermediate thicknesses of sandstone and slate. At many points, notably the collieries located along the south dip of the Mahanoy basin and in portions of the Mt. Carmel shaft colliery the Mammoth occurs as one bed.

In other portions the Mt. Carmel shaft colliery the lower member of the Mammoth bed is much more extensively mined than the upper, while across the Mt. Carmel basin at the Pennsylvania colliery, only a few thousand feet north, the upper member is extensively worked over large areas and the bottom member but slightly worked. This fact is worthy of note, in connection with the already mentioned changes peculiar to the Mammoth bed in this and other vicinities.

In the same collieries it is divided into two and sometimes three distinct members. This makes the identity of beds in different areas very difficult, as in many cases two or more beds having a workable thickness and whose individuality is well established at other points are joined and make but one workable coal bed. This feature is especially marked in the Mahanoy basin, in fact even with the extended workings at the Merriam, Monitor, Locust Gap and Locust Spring collieries the identity of all the beds is at present uncertain. An especial study of the beds at these collieries will shortly be made by the Survey with the object of exhibiting the accurate identity of the beds worked. It is believed that this can be very satisfactorily done when the mine workings have been further advanced. The present uncertainty in the identity of the individual beds is well illustrated by an incident which occurred in connection with the Monitor and Locust Spring collieries. The main slopes of both collieries are sunk on the supposed bottom bench of the Mammoth. In the Locust Spring colliery a tunnel was driven north 120 feet cutting the Skidmore bed (so called) at that distance. An air way in the east gangway opened from this tunnel was driven up the pitch and "holed" into the west bottom gangway from the Monitor colliery slope. This gangway is on what has always been accepted as the bottom member of the Mammoth bed, the slate separating this bed and the Skidmore bed elsewhere having disappeared and the two beds at this one point forming but one. This fact alone throws great doubt on the present identity of the beds, a doubt which can only be removed by the advance of the mine workings and a connected study of adjoining collieries.

The Holmes or No. X bed is worked at but one point on the sheet, in the Pennsylvania colliery, where it is developed by the underground tunnel driven north from the upper member of the Mammoth bed. The following section was taken at the face of this tunnel:

Top, hard sandstone.

Slate,	1′	10″
Rough coal,	1′	8″
Coal,	1′	2″
Bone,		2″
Rough coal streaked with bone,	2′	3″
Slate and bone,		11″
Total,	6′	11″

Bottom, sandstone.

The Locust Mountain anticlinal, which plays such a prominent part in the geology of the field on the sheets to the east, also crosses the entire width of Sheet No. V. The dips of the anticlinal are plainly seen in the gap cut through Locust Mountain by the waters of Locust creek in their course to the north. Unlike the sheets to the east there are almost no explorations made along Locust Mountain in the beds which underlie the Mammoth, the probabilities are, however, that the Skidmore and Seven Foot beds outcrop on both dips of the anticlinal along the entire length of the sheet and that the outcrop of the Buck Mountain bed is exposed from the eastern edge of the sheet to a point several hundred feet west of the gap made by Locust creek. The thickness of the long interval between the Buck Mountain and Lykens Valley beds precludes the possibility of this bed rising to the surface on the crest of the anticlinal.

The fact that the beds which underlie the Mammoth have not been explored along this anticlinal makes it impossible to give any definite estimate of their character or thickness. Such an estimate would be purely conjecture.

One feature worthy of mention is that the steepest dips which have been developed along the entire Mahanoy basin are found on this sheet; at several points they very nearly approach 90 degrees.

The Germantown Overturn basin, which has been referred to on Mine sheet No. IV, crosses the eastern edge of Sheet No. V, where it is encountered in the workings of the Merriam, Monitor and Locust Gap collieries. Its character is similar to that on Mine sheet No. IV, the overlap being equally extended. The structure and position of the coal beds in the Merriam and Monitor collieries is made still more complicated by the development of a second overturned anticlinal. The mine workings of these collieries have so far developed these abnormal dips that the construction of a very accurate section illustrating their various flexures is possible at a number of points.

On the western side of the sheet a third important overturned anticlinal has been developed in the workings of the Locust Spring colliery. A hoisting shaft was recently sunk to a counter gangway at this colliery and from its foot an airway driven to the surface. This airway struck the summit of the overturned anticinal, thus accurately defining its location. 300 feet west of the mouth of this hole, trial shafts have been sunk, which develop the outcrop of the Mammoth bed on both dips of the anticlinal. The south outcrop of this anticlinal will be still further developed as the workings from the New Locust Spring hoisting shaft, are advanced to the west. The bottom of the overturned basin attending this anticinal on the north has not yet been reached by the workings of the Locust Gap colliery. Succeeding lifts from this colliery will, however, undoubtedly come in contact with it.

It will be noted that the Philadelphia and Reading, the Northern Central and the Lehigh Valley railroads are all represented in this portion of the field.

The drainage of the areas on the sheets to the east has been generally into Mahanoy creek, but on Sheet V, near its southwestern corner a watershed occurs, which throws the drainage into Shamokin creek, and makes the grade of the railroads favorable to a western trade.

Mine Sheet No. VI.

The Western Middle field is generally divided by the coal trade into the Mahanoy and Shamokin districts. Sheet No. VI, which is entirely within the boundaries of Northumberland county, contains a very small portion of the extreme western end of the Mahanoy basin and includes within its boundaries the most important part of what is usually known as the Shamokin district.

The town of Shamokin, from which the sheet gets its name, is located in its extreme northwestern corner. The drainage of the area embraced by the sheet is through Shamokin creek and its tributaries.

With the exception of a small portion in the southwest corner, the area of the sheet is included within the coal measures. In the vicinity of Shamokin the basin is very steep, and with the possible exception of a small area near

Ashland, contains a greater number of workable coal beds than at any places in the Western Middle field.

The parting between the Mauch Chunk red shale and the Pottsville conglomerate has been very accurately located by survey. It follows in an almost parallel direction, the wagon road through Helfenstein and Shamokin, until it reaches the top of Locust Mountain, where it swings to the northeast and turns west along the rise of the Locust Mountain anticlinal ; from here it follows the regular north dip to the west.

The Lykens Valley coal bed has been extensively worked at the Ben Franklin colliery by Douty and Baumgartner, with this exception the Lykens Valley bed on this sheet is undeveloped. West of the Ben Franklin colliery no developments of any kind have been made on this bed. While these workings at the Ben Franklin colliery are the only ones on the sheet, others have been made at the Cameron colliery just north of the sheet in the Lykens Valley bed which will suggest some idea of its thickness along the northern portion of the sheet.

There is a possibility, hardly a probability that the coal bed of the Mt. Franklin colliery is identical with the Lykens Valley bed. It is however more likely a leader between that bed and the Buck Mountain.

The Buck Mountain or No. V bed has been opened at the Brady and Greenback as well as at the Enterprise collieries. The actual mining of the Buck Mountain coal bed on this sheet has been quite limited there being no exposures along its outcrop other than those developed by the progress of the mine workings.

The Skidmore bed has been worked only at the Enterprise colliery, a section is as follows :

Rock top.

Coal,	4′ 3″
Slate,	2″
Coal,	6′

Rock bottom.

The Mammoth bed is extensively worked on the sheets, although there is still a large area east of Shamokin along Quaker run in which all the beds are untouched. On this sheet the Mammoth is almost invariably worked in two splits, one being worked to the same extent as the other.

The beds above the Mammoth are extensively worked just south of the town of Shamokin at the Henry Clay, Peerless, Frank Gowan, Franklin, Clinton, Alpha and Daniel Webster collieries, the thicknesses of these beds are as follows: Bed No. XVI, 5′, Bed No. XV, 6′, Bed No. XIV, 8′, Bed No. XIII, 6′, Orchard Bed No. XII, 4′, Primrose Bed No. XI, 7′ and Holmes Bed No. X, 3′.

The most notable features on this sheet are the outcroppings along their axes of the Mahanoy basin and of the Locust Mountain anticlinal. This basin and anticlinal are prominent on all the sheets to the east and their disappearance from the coal measures, and the succession of another series of basins and anticlinals succeeding them is a matter of great interest.

It will be noted that in the exploration of the Mahanoy basin the flexures developed on Mine sheets I and II and all of those on Mine sheet III, with the exception of the Centralia basin, are lost and that all the flexures which appear west of the extreme end of the Locust Mountain anticlinal are, with the same exception, those which have first made their appearance on sheets IV and V. In the description of Mine sheet No. V reference was made to the overturned anticlinal developed by the Locust Spring colliery, and mention made of the exposures of the outcrop of the Mammoth bed on both dips of the overturn. After crossing the western edge of Mine sheet VI the anticlinal broadens, thus increasing the distance which separates the main Mahanoy basin from its more northern spur which is first developed between the Locust Gap and the Locust Spring collieries. The Locust Spring overturn dip is in the northern of these two basins. Where it crosses the eastern edge of Mine sheet VI, the overlap extends some distance across the basin but before it reaches the extreme western end of this northern spur the overturn changes to a perpendicular dip. There are no shaftings along the outcrop of the northern basin, so that its position is necessarily approximately located from surface exposures without the aid of trial shafts. The Mammoth bed in the more southern or main Mahanoy basin extends west of the edge of the sheet a distance of 6700 feet. Its outcrop is located by a series of trial shafts. The elevation of both outcrops of the basins at their extreme western end is about 1500 feet above tide which is within 100 feet of the elevation of the extreme eastern exposure of the Mammoth bed in the Mahanoy basin on sheet I. The beds underlying and overlying the Mammoth in the two spurs which cross the west line of Sheet No. VI have not been opened either by shaftings or mining. There thickness and condition is therefore impossible to determine. The fact of the existence of the overturned anticlinal which separates them adds much more doubt to their condition.

A prominent feature on Sheet VI is the Big Mountain anticlinal. The workings of the Excelsior collieries have developed the outcrop of the Mammoth bed on the north, east and south dips of this anticlinal while the Big Mountain colliery has developed the north, south and west dips of the anticlinal. Along its course Shamokin creek cuts through it almost at right angles to the axis and here exposes the outcrop of the Buck Mountain bed. The erosion along this outcrop is very irregular. In the vicinity of the Greenback gap there is over 2000 feet between the outcrops of the north and south dips of the Mammoth while just south of the Buck Ridge colliery there is but 300 feet between the same exposed dips.

Mine Sheet No. VII.

The southern portion of this sheet, probably one-third of its area. is outside of the coal measures. A large portion of the balance is entirely unworked. No railroads have been constructed extending west of the Bear Valley shaft. The entire drainage is west into Shamokin creek, which crosses the border of the sheet near its north-eastern corner. The outcrop of the Lykens Valley bed is located throughout its entire length by actual survey. The only openings along the south side of the basin were found on the Wilson and Dewart tract. One of these was a slope which was sunk about 25 yards, and from which short gangways have been driven east and west. The thickness of the bed is about 10 feet. Other portions of this outcrop were located from the characteristic topography which usually accompanies the Lykens Valley bed. It is worthy of note that on all the existing maps there is a marked break in the continuity of the Lykens Valley crop, south of the Bear Valley shaft workings. The form of this change of direction would indicate a saddle and basin. such do not exist in the Lykens Valley bed, and the direction of the outcrop is regular and continuous. This formation was probably suggested by the outcrop of the Mammoth bed rising from the Enterprise basin, and the Lykens Valley outcrop was placed on the maps parallel to that of the Mammoth. The slightest observation on the ground, however, dispels this idea.

The Buck Mountain bed is cut in the Burnside tunnel. A section shows:

Top.		
Coal, good,	2	0'
Slate,		2''
Coal, good,		9''
Slate,		2''
Coal,	3'	0''
Bottom.		

This is the only point on this sheet where the Buck Mountain bed has been mined. Whether it will maintain or increase this thickness is purely a matter of conjecture. The Seven Foot and Skidmore beds Nos. VI and VII are not mined on the sheet so that it is impossible to make any estimate of their value.

The Mammoth bed on this sheet, as on Mine Sheet VI, occurs in two splits, both of which are worked. Wherever the bed has been opened the average thickness of the lower member No. VIII shows 9', while the upper member No. IX shows 7'. On portions of the sheet a third member occurs 6 feet thick.

About one-half of the area of the coal measures on this sheet are entirely undeveloped by mine workings, and with the exception of a single line of trial shaftings in about the center of this undeveloped area, there is almost no exposure of the outcrop of any of the coal beds in the series. This area is covered with wash, and is so heavily overgrown with underbrush and timber, that it is impossible to trace the synclinal and anticlinal axes, and without further developments, it is impossible to express in detail an opinion of any value on the character and condition of the coal measures which are here contained. There is no reason to suppose that the coal within this area is not equal in thickness and purity of that in the vicinity of Shamokin.

Mine Sheet No. VIII.

All of the area covered by this sheet, is in Northumberland county, and is the last and most western of the series in the Western Middle coal field. Of the three divisions, Mahanoy, Shamokin and Trevorton, in which the Western Middle coal field is generally divided, Sheet No. VIII may be said to include all of the Trevorton district.

The watershed which separates the drainage areas of Carbon run and Zerbe runs. is at the eastern edge of Sheet VIII. This watershed defines the boundary between the Trevorton and Shamokin districts. The outlet of Zerbe run is through the gap in the mountain at the North Franklin No. I colliery. Within the area drained by this creek are the workings of the Trevorton collieries. Less than half of this sheet is covered by the coal measures, the basin rapidly narrowing as it approaches its western end.

The outcrop of the Lykens Valley bed is well proven by a series of shaftings, all of which have been located by survey. On the maps of the operating companies, the extreme western end of the basin is located 2¼ miles west of the Trevorton gap, and is shown as a single curved line. The actual fact, however, which has been recently confirmed by a series of shaftings, is that the outcrop of the Lykens Valley bed extends west a mile beyond the limits shown on the company maps, and that instead of curving in one single line, its regularity is broken by a marked indentation, which is caused by a prominent anticlinal. This anticlinal apparently being the same which is shown in the Mammoth bed at the water level drifts of the North Franklin No. 2 colliery. As the shaftings along the outcrop of the Lykens Valley bed in this vicinity have been accurately located by survey, there can be no doubt of the inaccuracy of the existing maps in this particular.

One of the marked features in the coal measures on this sheet is the unusual development of both of the Lykens Valley coal beds, each of which will average about 10′ in thickness. Both of these beds have been extensively mined at North Franklin No. I colliery, but the workings on them are at present abandoned. Below the Mammoth, the Buck Mountain and Seven Foot have also been worked, each showing a thickness of 7′. The Mammoth as on Sheet VI and VII, appears in two separate beds.

In the workings of the rock slope at North Franklin No. 2 colliery, a coal bed is cut 112 feet under the lower member of the Mammoth, which is locally known as the Skidmore. More extended developments, however, will possibly prove that this bed is a third split of the Mammoth, with existing data, however, such a conclusion may be premature.

The thickness of each of the members of the Mammoth bed on this sheet is 12′. The beds above the Mammoth have not been worked, and have only been proven in a series of shaftings.

All the coal on these sheets is mined by the North Franklin Nos. 1 and 2 collieries, and while the sheet and district receives its name from the town of Treverton. This town is not only outside the borders of the sheet, but also beyond the borders of the coal measures. Together the North Franklin collieries 1 and 2, are known as the Treverton collieries.

CHAPTER IV.

Statistics of the Production and Shipment of Anthracite Coal for 1885 and 1886.

The anthracite region of Pennsylvania is the most important in the States, on account of the special character of the coal which it produces; from its situation in the most thickly populated portion of the United States; and from the amount of coal which it is yearly producing. It is the most desirable domestic fuel, natural gas alone excepted, which is found anywhere and it is distributed to more widely separated markets than any other one coal; 34.62 per cent. of all the coal produced in the United States during 1886 came from the anthracite mines. The center of the region is distant from New York about 200 miles, and from Philadelphia about 125 miles, with which cities it is connected by seven distinct and independent systems of railroads and by three distinct and separate systems of water ways.*

Unlike most of the other coal regions of the United States, particularly those east of the Rocky mountains, its coal beds are highly plicated, occurring under all degrees of dip; in some cases the beds are inverted beyond the perpendicular.

The area of maximum folding and contortion of the coal bearing measures is in the Southern and Western Middle fields, where the occurrences of isoclinals and sharp narrow anticlinals and synclinals is most frequent. In other fields the flexures gradually become flatter, broader, and further apart toward the north-west. The structure in the Eastern Middle field is an apparent exception; when it is remembered, however, that in this district the flexures in the coal measures are found at a much greater height above ocean level, and the coal-basins are generally much shallower than in the Southern field, the general conclusion holds true, for the most complicated structure is invariably found in the bottoms of the coal-basins, where the squeezing of the strata was the greatest during the original plication.*

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*The information contained in this chapter was collected by the Geological Survey and prepared for publication by Mr. Ashburner; it was published by permission in the Mineral Resources of the United States for 1885 by the U. S. Geological Survey.

The Northern field, which is further removed from the area of maximum disturbance, is composed of a broad, canoe-shaped basin with moderate dips, the surface of any one of the coal measure strata, in general, being but slightly undulated by broad, low anticlinals and shallow synclinals, while the structure of the Loyalsock and Mehoopany field,† which is still further removed is identical with that of the Pennsylvania bituminous field; the average maximum dips of the coal bed ranging from between 3 feet in one hundred to 5 feet in one hundred.

Some idea may be had from the following table, of the depths of some of the anthracite basins in which information has been obtained, of a sufficiently definite character, to permit of estimates being made. The elevations are given in feet above ocean level:

Northern Field, Wilkes Barre basin.

	Feet.
Wilkes-Barre (L. V. R. R. depot), ...	+549
Mammoth bed outcrop on north side of basin, at Kingston Coal Company's slope No. 2, ...	+778

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* The difficulties which have been encountered in mining near and in the bottoms of the Lehigh basins, foreshadow the greater irregularities of structure, which will probably be met with in mining in the bottoms of the Southern field basins. Although the details of structure are rarely duplicated in different districts, yet I believe a careful mapping and study of the structural geology of the Lehigh basins will aid materially in the most economical development of the deeper portions of the Southern field basins.

† This field has been provisionally named the Western Northern.

Mammoth bed outcrop on south side of basin, at Hollenback slope No. 2,	+774
Bottom of Mammoth bed basin under flat, north of Wilkes-Barre (estimated),	+800*

Width of basin, 23,200 feet (4.4 miles).

Eastern Middle field.

Drifton Basin.

Drifton (L. & S. R. R. depot),	+1633
Buck mountain bed outcrop on north side of basin, at Drifton slope No. 2,	+1692
Buck Mountain bed outcrop on south side of basin,	+1645
Bottom of Buck Mountain bed basin,	+1150

Width of Basin, 2,250 feet (.4 miles.)

Hazleton Basin.

Hazleton (L. V. R. R. depot),	+1612
Mammoth bed outcrop on north side of basin,	+1660
Mammoth bed outcrop on south side of basin, at Hazleton slope No. 6,	+1672
Bottom of Mammoth bed basin,	+850

Width of basin along line through Slope No. 6. 3800 feet (.7 miles).

Western Middle field, Mahanoy basin.

Gilberton (P. & R. R. depot),	+1133
Mammoth bed outcrop on north side of basin, Gilberton slope,	+1223
Mammoth bed outcrop on south side of basin, at Draper slope,	+1275

Width of basin along line through Gilberton slope, 3050 feet (.6 miles).

Southern field, Panther Creek basin.

(Near Tamaqua).

Tamaqua (P. & R. R. R. depot),	+803
Mammoth bed outcrop on north side of basin,	+1250±
Mammoth bed outcrop on south side of basin,	+1300±
Bottom of Mammoth bed basin (estimated),	—1000

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[*] Depth attained by workings in Prospect colliery is now over 300 feet below ocean level.

The Anthracite region has been grouped into five principal divisions, as follows:

(1) Northern or Wyoming and Lackawanna field lies in the two valleys from which it derives its geographical name, and is embraced almost entirely by Luzerne and Lackawanna counties. A small area in the extreme north-eastern end of the field extends into Wayne and Susquehanna counties.

(2) Eastern Middle or Upper Lehigh field, lying between the Lehigh river and Catawissa creek and principally in Luzerne county, with limited areas extending into Carbon, Schuylkill, and Columbia counties.

(3) Western Middle or Mahanoy and Shamokin field, lying between the easternmost headwaters of the Little Schuylkill river and the Susquehanna river and within Schuylkill, Columbia, and Northumberland counties.

(4) Southern or Pottsville field, extending from the Lehigh river, at Mauch Chunk, south-west to within a few miles of the Susquehanna river, directly north of Harrisburg, and embraced by Carbon, Schuylkill and Dauphin counties. The eastern end of this field, known as the Lower Lehigh or Panther Creek basin, between Tamaqua, on the Little Schuylkill river, and Mauch Chunk, on the Lehigh river, has generally been included by the coal trade in the Lehigh field, from the fact that its coals resemble more closely the coals obtained in the Upper Lehigh region than those in the Pottsville field west of Tamaqua, and since the shipments to market have almost entirely been made through the Lehigh Valley.

(5) Loyalsock and Mehoopany field lies within the area drained by the headwaters of the Loyalsock and Mehoopany creeks, and is contained in Sullivan and Wyoming counties. This field is from 20 to 25 miles north-west of the western end of the northern field. Its geological structure resembles more closely that of the bituminous field, in which it has until recently been included, although the composition of many of its coals entitles them to rank with a number from the anthracite region.

Each of the above divisions are sub-divided into districts. The following table gives the name of each colliery in the region, together with its location, name of operator, shipping railroad, and production or shipment in 1884, 1885 and 1886. It also gives reference numbers by which each colliery can be found on the map of the region in the atlas accompanying this report.

The following tables give the shipments and productions in 1884, 1885, and 1886, of the collieries at work in—

Page.
1. Carbondale district, ... 1013
2. Scranton district, ... 1014
3. Pittston " 1016
4. Wilkes Barre district, ... 1018
5. Plymouth " 1020
6. Green Mountain " 1021
7. Black Creek " 1021
8. Hazleton " 1022
9. Beaver Meadow " 1022
10. East Mahanoy " 1023
11. West " " 1023
12. Shamokin " 1025
13. Panther Creek " 1026
14. East Schuylkill " 1027
15. West " " 1027
16. Lorberry " 1028
17. Lykens Valley " 1029
18. Loyalsock " 1029

NORTHERN COAL FIELD.

1. *Carbondale District.*

Map number.	No. of inspector's district.	NAME OF COLLIERY.	Location.	Operator.	Shipping Railroad.	1884.		1885.		1886.	
						Shipment, Long tons.	Production, Long tons.	Shipment, Long tons.	Production, Long tons.	Shipment, Long tons.	Production, Long tons.
1	1	Olyphant No. 2,..	Olyphant boro',	Del. & Hud. C. Co.,	D. & H. Can. Co.,	72,145	....	507	8,091	....	....
2	1	Eddy Creek, ...	Olyphant boro',	" " " "	" " " " "	84,278	....	124,512	135,194	143,625	163,573
3	1	Grassy Island,...	Olyphant boro',	" " " "	" " " " "	115,583	....	124,435	134,833	100,903	112,417
4	1	White Oak,......	Archbald, ...	" " " "	" " " " "	114,353	....	97,914	103 821	109.168	115,453
5	1	Jermyn slope, ...	Jermyn, ...	" " " "	" " " " "	66,021	....	28,900	31,561	31,724	35,734
6	1	Jermyn shaft,...	Jermyn, ...	" " " "	" " " " "	117,092	....	122,938	140,367	150,353	167,895
7	1	Racket brook,...	Carbondale, ...	" " " "	" " " " "	157,797	....	188,411	190,601	182,257	184,948
8	1	Coal Brook,......	Carbondale, ...	" " " "	" " " " "	199,699	....	225,334	228,550	235,880	239,502
9	1	No. 1 shaft, ...	Carbondale, ...	" " " "	" " " " "	51,955	....	33,322	34,462	27,165	30,295
10	1	No. 3 shaft, ...	Carbondale, ...	" " " "	" " " " "	11,002	....	2,584	6,653	....	....
11	1	Erie shaft,.......	Glenwood,......	Hillside C. & I. Co.,..	" " " " "	155,501	....	113,643	114,953	123,275	125,008
12	1	Keystone,.......	Glenwood, ...	" " " "	" " " " "		....	61,184	61,184	118,793	118,952
13	1	Forest City,.....	Susquehanna co.	" " " "	N. Y. L. E. & W.	72,696	....	83,164	84,459	92,149	97,072
14	1	Jermyn No. 4, ...	Priceville, ...	John Jermyn, ...	D. L. & W. R. R.,	95,746	....	126,944	127,107	161,883	163,252
15	1	Filer slope, ...	Winton boro', ..	Griffiths, Thos. & Co.,	" " " " " "	42,614	....	46,717	47,575	43,262	45,207
16	1	Grassy Island, ...	Winton boro', ..	Grassy Isl'd C. Co. (L.)	D. & H. Can. Co.,	107,649	....	106,132	109,096	85,215	87,501
17	1	Powderly, ...	Carbondale, ...	Del. & Hud. Canal Co.,	" " " " "	49,922	....	50,147	54,843	77,598	82,298
18	1	Edgarton,........	Blakely twp.,...	Edgarton C. Co. (L.),	" " " " "	23,276	....	73,524	75,126	112,577	113,797
19	1	Eaton, ...	Blakely twp.,...	Jones, Simpson & Co.,	" " " " "	81,749	....	86,650	86,791	94,907	95,246
20	1	Pierce, ...	Blakely twp.,...	Pierce Coal Co. (L.)..	D. L. & W. R. R.,	98,028	....	90,357	92,007	83,496	84.921
21	1	Lackawanna,....	Blakely boro', ..	Lack. Coal Co. (Lim.),	" " " " " "	126,000	....	122,250	123,645	153,329	155,016
22	1	Dolph, ...	Winton boro', ..	Dolph Coal Co. (Lim.),	" " " " " "	11,699	....	23,731	23,909	61,627	62,195
23	1	Belmont,........	Carbondale, ...	Watkins & Son,......	N. Y. L. E. & W.	18,331	....	....	....	10,695	11,907
24	1	Blanc'd (Simps'n)	Fell township,..	N. Western Coal Co.,	" " "	....	....	11,622	12,170	22,225	23,225
25	1	Brennan, ...	Fell township,..	Thomas Brennan,...	" " "	7,200	....	....	....	2,790	2,940
A	1	Marshwood, ...	Olyphant boro',	Moosic M'nt'n C. Co.,	D. & H. Can. Co.,	....	....	....	....	....	475
B	1	S. V. White, ...	Winton boro',..	Winton Coal Co.,....	" " " "	....	....	....	....	44,758	45,671
						1,880,336		1,944,902	2,027,298	2,269,744	2,364,495

NORTHERN COAL FIELD.

2. *Scranton District.*

Map number.	No. of Inspector's district.	NAME OF COLLIERY, 1884.	Location.	Operator.	Shipping Railroad.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
26	2	Sibley, ...	Old Forge twp., Lacka. co.	Elliott McClure & Co.	L. & B. R. R., ...	47,818	....	69,944	79,646	65,394	65,394
27	2	Greenwood shaft and slope.	Lacka. twp., ...	Penn. Anth. Coal Co.	D. & H. and L. & S. R. R.	130,955	....	120,197	121,685	32,178	34,433
28	2	Dunn S. and S, ...	Old Forge twp.,	" " " "	L. & B. R. R.	59,818	....	78,585	88,297	117,541	118,597
29	1	Mdow. Brk. shaft,	Scranton, 20th ward.	Wm. Connell & Co...	" "	143,263	....	112,117	131,308	140,927	176,500
30	1	Nat. S. and S. and Mdow. Brk. tun.	Lacka. twp., ...	" " " " ..	" "	119,627	....	106,522	106,522	98,992	98,992
31	1	Bridge, ...	Scranton, 14th ward.	Bridge C'l Co. (Lim.)	D. & H. and L. & S. R. R.	64,560	....	60,924	75,539	78,649	102,902
32	1	Mt. Pleasant, ...	Scranton, 14th ward.	William T. Smith....	D. L. & W. R. R.	107,000	....	114,637	123,637	125,282	133,582
33	1	Green Ridge, ...	Dunmore bor.,	O. S. Johnson........	D. & H. C. Co....	139,000	....	130,045	135,749	130,856	185,486
34	1	Church, ...	Scranton, 2nd ward.	Church C'l. Co. (Lim.)	" "	....	....	4,953	14,000	2,700	10,340
35	1	Archdale shaft,	Lacka. twp.	D. L. & W. R. R. Co.	D. L. & W. R. R..	114,876	....	29,262	33,081	157,557	167,657
36	1	Sloan, ...	" "	" "	" "	124,537	....	172,770	180,205	165,843	176,956
37	1	Pyne, ...	" "	" "	L. & B. R. R.	148,193	....	166,367	173,100	166,907	174,134
38	1	Taylor, ...	" "	" "	" "	124,118	....	143,549	150,602	175,782	186,713
39	1	Oxford, ...	Scranton, 5th ward.	" "	" "	66,104	....	15,134	19,510	120,007	127,241
40	1	Dodge, ...	Lacka twp., ...	" "	" "	118,240	....	145,979	151,444	148,053	158,068
41	1	Bellevue shaft, ..	" "	" "	" "	74,553	....	119,960	124,680	168,863	184,243
42	1	Bellevue slope, ..	" "	" "	" "	68,104					
43	1	Hampton shaft,	" "	" "	D. L. & W. R. R.	146,596	....	....	....	40,376	44,498
44	1	Continental, ...	" "	" "	" "	136,894	....	182,169	180,345	22,328	26,508
45	1	Central shaft, ...	Scranton, 5th ward.	" "	" "	178,385	....	213,011	227,848	206,450	227,956

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46	1	Hyde Park,......	Scranton, 15th ward.	" "	" "	138,681	....	177,156	183,260	136,565	142,321
47	1	Diamond,									
		Shaft No. 2,...	Scranton, 21st ward.	" "	" "	100,505					
		Slope No. 2,...	Scranton, 21st ward.	" "	" "	21,789	....	205,458	223,813	213,429	232,758
		Tripp slope,..	Scranton, 21st ward.	" "	" "	65,347					
		" shaft.,	Scranton, 21st ward.	" "	" "	4,146					
48	1	Brisbin,.........	Scranton, 3d ward.	" "	" "	130,601	....	148,218	158,245	16,716	22,406
49	1	Cayuga,.........	Scranton, 3d ward.	" "	" "	113,218	....	164,398	169,920	159,771	170,416
50	1	Scranton slope,..	Scranton, 3d ward.	" "	" "	76,525					
51	1	Dunmore shaft No. 2,	Dunmore boro',	Penn'a. Coal Co......	E. & W. V. R. R..	51,834	....	26,768	45,490	66,212	66,652
52	1	Gypsy Grove shaft No. 3,	" "	" "	" "	49,073	....	115,544	124,158	122,231	122,231
53	1	Gypsy Grove shaft No. 4,	" "	" "	" "	55,189					
54	1	Dunmore shaft No. 5,	" "	" "	" "	52,207	....	71,174	79,471	107,080	109,212
55	1	Dunmore brak'r,	" "	" "	" "	....	....	93,712	94,071	....	....
56	1	" screens,	" "	" "	" "	....	....	90,189	90,627	....	....
57	1	Legitts Ck. shaft,	Scranton, 1st ward.	D. & H. Canal Co....	D. & H. C. Co.	133,532	....	147,461	158,416	152,675	165,462
58	1	Marvine.........	Scranton, 1st ward.	" "	" "	154,834	....	172,911	185,431	144,555	157,075
59	1	Von Storch,......	Scranton, 2nd,..	" "	" "	209,450	....	220,525	241,538	214,080	236,991
60	1	Capouse.........	Scranton, 21st,..	Lack. Iron & Coal Co.	D. L. & W. R. R.	875,807	....	859,131	871,707	880,052	890,600
61	1	Pine Brk. shaft..	Scranton, 7th ward.	" "	" "	43,587	....	....	....	4,863	8,575
62	1	Fairlawn,........	Scranton, 7th ward.	Fairlawn C.Co.(Lim)	" "	12,030	....	44,945	46,146	40,685	54,776
63	1	Manville,........	Scranton, 13th ward.	D. & H. C. Co. and D. L. & W. R. R. Co.	D. & H. C. Co.	170,888	....	180,553	192,176	147,118	159,478
64	2	Holstead,........	Marcy twp.,.....	D. L. & W. R. R. Co.	L. & B. R. R.	177,924	....	141,199	146,508	174,211	182,474
65	1	Pancoast shaft,..	DicksonCity bo.,	Pancoast Coal Co....	D. L. & W. R. R.	88,902	....	129,228	142,118	121,314	136,449
66	1	Dickson shaft,...	Scranton, 2nd ward.	D. & H. Canal Co....	D. & H. C. Co.	80,815	....	107,365	108,895	158,636	169,347
67	1	Holden,.........	Taylorsville,....	Amity C. Co. (Lim.)..	L. & B. R. R.	11,911	....	29,280	30,759	114,072	117,928
68	2	Glendale,.......	Lacka. twp.,....	Glendale Coal Co. ...	L. & S. R. R.	9,547	....	39,549	40,260	14,743	15,627

2. *Scranton District—Continued.*

Map number.	No. of Inspector's district.	NAME OF COLLIERY, 1884.	Location.	Operator.	Shipping railroad.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons,	Shipment—long tons.	Production—long tons.
69	1	Richmond shaft,	Scranton, 2nd ward.	Elk Hill C. & I. Co...	D. L. & W. R. R.	6,079	....	34,316	34,916	37,597	39,347
70	1	Spencer,..........	Dunmore,.......	A. D. & L.M. Spencer,	" "	55,070	....	87,696	95,096	75,829	83,132
	1	Local Sales Mines	....	....	....	....	....	....	33,534	....	35,840
								4,782,116	5,120,553	4,765,544	5,164,289

3. *Pittston District.*

Map number.	No. of Inspector's district.	NAME OF COLLIERY, 1884.	Location.	Operator.	Shipping railroad.	1884. Shipment—long tons.	1884. Production—long tons.	1885. Shipment—long tons.	1885. Production—long tons.	1886. Shipment—long tons.	1886. Production—long tons.
71	2	Exeter, ...	West Pittston,	Lehigh Valley C. C.	L. V. R. R.,......	127,170	134,800	14,386	15,822		
72	2	Heidelb'g shaft,	Pittston twp.,	" " "	"	85,000	....	78,605	79,038	109,700	110,000
73	2	Everhart (Boston,)............	Jenkins twp.,	Dininny & Cowan,	L. & S. R. R.,....	28,000	....	29,634	30,131	31,350	31,350
74	2	Tompkins shaft,	Pittston boro'	A. Tompkins,........	L. V. R. R., ...	16,247					
75	2	Spring Brook,	Lackawanna tp.	W. E. Colburn,......	D. & H. C. Co.,	38,700	....	32,522	33,076	26,340	26,615
76	2	Twin shaft,......	Pittston boro',	Butler Coal Co.,....	L. V. R. R.,......	46,969	....	19,525	20,646	62,298	62,293
77	2	Beaver Slope,....	" "	Waterm'n & Beav'r,	"	2,976					
78	2	Phœnix, ...	Marcy twp., ...	Phœnix Coal Co.,....	L. & B. R. R.,....	46.714	....	10,391	11,249		
79	2	Fairmount,......	Pittston twp.,	J. N. Rice,..........	D. & H., L. & S.,	47,562	....	....	....	7,000	7,300
80	2	Butler, ...	" "	Dininny & Cowan,	D. & H., L. & S.,	32,068	....	31,411	36,496	18,051	20,936
81	2	Mosler, ...	Hughestown,	Butler Coal Co.,....	L. V. R. R.,......	69,662	....	77,230	78,513	92,834	92,834
82	2	Schooley, ...	Wyoming,......	" " "	"	78,322	88,021	149,581	154,871	140,598	140,598
83	2	Consolidated,....	Pleasant Val'y,	Hillside Coal & I. Co.	E. & W. V. R. R.,	60,387	....	110,161	111,271	95,973	97,172
84	2	Central,..........	....	....	....	....	....	....	98,860		
		Shaft No. 12,	Pleasant Val'y,	Penna. Coal Co., ...	E. & W. V. R. R.,	49,496	}				
		" No. 13,	Old Forge twp.,	" " "	" "	83,845	}				

85	2	Law shaft, ...	Pittston twp.,	" " "	" "	72,991	....	....	97,499	202,447	202,447
86	2	Barnum, ...	Marcy twp., ...	" " "	" "	218,725	....	....	215,670	207,942	207,942
87	2	Stark, ...	Lackawanna tp.	" " "	" "	39,490					
88	......	Breaker No. 6, ...	....	....	....	....	....	....	150,886	108,725	108,725
	2	Shaft No. 5,	Jenkins twp.,	Penna. Coal Co.,*	E. & W. V. R. R..	65,911					
	2	" " 6,	" "	" " "	" "	49,408					
	2	" " 11,	" "	" " "	" "	27,348					
89	......	Breaker No. 8, ...	....	....	....	....	....	....	97,005	71,249	71,249
	2	Shaft No. 1, ..	Hughest'n bor'	Penna. Coal Co., ...	E. & W. V. R. R.,	49,817					
	2	" " 8, ..	" "	" " "	" "	60,817					
	2	Slope No. 6, ..	" "	" " "	" "	2,137					
C	......	Shaft No. 14, ...	....	" " "	" "	....	....	....	....	52,567	52,567
90	......	Breaker No. 10, ..	....	....	....	....	....	....	213,890	170,815	170,815
	2	Shaft No. 9, ..	Pittston boro',	Penna. Coal Co.	E. & W. V. R. R.,	83,137					
	2	" " 10, .	Hughest'n bor',	" " "	" "	115,832					
91	2	Shaft No. 4, ...	Pittston twp.,	" " "	" "	56,545	....	....	59,436		
92	2	" " 7, ...	Jenkins "	" " "	" "	77,533	....	....	79,021	98,853	98,858
93	2	Slope No. 2, ...	" "	" " "	" "	89,237	....	....	44,291		
94	2	" " 4, ...	Pittston "	" " "	" "	62,911	....	....	57,902		
95	2	Tunnel No. 1, ...	" "	" " "	" "	40,393	....	....	39,219		
96	2	Old Forge, ...	Old Forge twp., Lackaw'a co.,	" " "	" "	14,923	....	....	130,465	152,015	152,015
97	2	Eagle, ...	Jenkins twp.,	" " "	" "	18,325					
98	2	Elmwood, ...	Pittston twp.,	Florence C. Co.(Lim.)	D. & H. and L. & V. R. R.	21,759	....	52,635	52,906	74,171	77,633
99	2	Davis............	West Pittston,	Clearspring C. Co., ..	L. & B. R. R., ...	187,501	145,751	120,934	136,256	124,777	132,125
100	2	Hunt, ...	Wyoming, ...	D. L. & W. R. R......	"	38,329	40,629	30,518	33,973	55,222	62,342
D	2	Katydid, ...	Moosic, ...	John M. Robertson,	D. & H. C. Co.,	....	....	....	....	14,574	15,487
E	2	Keystone, ...	Plains twp., ...	Keystone Coal Co.,	"	....	....	....	....	2,457	2,607
								1,205,247*			
						2,055,855	....	1,971,780	2,071,900	1,914,953	1,938,905

* Total shipment Pennsylvania Coal Co., Pittston District, 1885, 1,205,247.

4. Wilkes Barre District.

Map Number.	No. of Inspectors District.	NAME OF COLLIERY, 1884.	Location.	Operator.	Shipping Railroad.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
		Sus. Coal Co.—									
101	3	Colliery No. 1,..	Nanticoke, ...	Susquehanna C. Co.	N.&W.B.RR	1,290,122	199,022	1,459,544*	198,970	1,581,286	219,161
102	3	" No. 2,..	"	" "	"		443,289		495,474		504,441
103	3	" No. 5,..	"	" "	"		506,631		540,378		547,677
104	3	Newport No. 6,..	Glen Lyon,......	" "	"				40,943		214,195
105	3	Maffet,..........	Sugar Notch, ..	Hanover Coal Co., ..	L. & S. R. R.,	98,082	95,466	112,080	115,679	119,643	120,618
106	3	Alden, ...	Alden, ...	Alden Coal Co.,......	L. V. R. R., ...	146,799	151,204	186,883	192,958	198,248	199,909
107	3	Warrior Run, ..	Warrior Run, ..	A. J, Davis,.........	"	60,600	68,440	72,210	80,400	68,564	76,774
108	3	Franklin, ...	Wilkes Barre, ..	Franklin Coal Co., ..	"	122,865	138,261	119,826	139,274	115,292	128,886
109	2	Hillman, ...	Minersvilleboro,	H. Baker Hillman,..	"	40,000	40,000	43,000	44,800	87,678	87,679
110	3	Hillman Vein, ..	Wilkes Barre, ..	Hillman Vein C. C.,	"	80,506	42,418	42,522	62,316	25,084	40,471
111	2	Enterprise, ...	Plains twp,.	A. Langdon, ...	"	80,000	86,509	87,049	40,679	90,085	95,704
112	2	Henry, ...	" "	Lehigh Valley C. C.,	"	97,156	106,700	158,476	168,998	177,094	187,627
113	2	Midvale, ...	" "	" " "	"	55,571	59,808	....	....	....	....
114	2	Mineral Spring,	" "	" " "	"	65,643	72,282	65,342	62,763	71,589	76,235
115	2	Prospect, ...	" "	" " "	"	196,988	206,791	303,228	303,889	304,286	304,431
116	3	Dorrance,........	Wilkes Barre, ..	" " "	"	....	11,743	9,461	19,231	33,128	42,905
117	2	Wyoming, ...	Plains twp., ...	" " "	"	206,859	216,098	174,598	181,519	151,864	159,074
118	2	Bennett, ...	" "	Waddell & Walter,..	L. & S. R. R.	72,728	78,694	94,356	97,588	93,970	97,198
119	2	Mill Creek, ...	" "	Del. & Hud. Canal C.,	"	162,762	162,762	169,213	169,213	129,167	129,167
120	2	Pine Ridge,......	" "	" " "	"	117,575	119,225	134,707	137,289	146,014	150,686
121	2	Laurel Run, ...	" "	" " "	"	109,711	109,711	111,386	111,386	114,609	114,609
122	3	Baltimore Slope,	Wilkes Barre twp., ...	" " "	"	75,488	75,488	88,575	88,575	61,071	61,071
123	3	" Tun'l,	Wilkes Barre twp., ...	" " "	"	121,686	121,686	28,869	28,869	108,701	110,942
124	3	Conyngham, ...	Wilkes Barre, ..	" " "	"	88,772	97,897	108,782	105,478	89,292	91,808
125	3	Red Ash No. 1,..	Wilkes Barre twp., ...	Red Ash Coal Co., ..	"	92,381	92,381	105,822	105,822	115,820	115,820

* Including Colliery No. 3, Plymouth District.

126	3	" " No. 2,..	Wilkes Barre twp., ...	" "	"	102,178	104,478	108,080	110,220	129,781	131,957
127	3	Diamond No. 1,	.Wilkes Barre, ..	Lehigh & W B. C. C.,	"	....	111,696	127,715	126,241	136,607	136,607
128	3	Hollenback, No. 2,	"	" "	"	....	161,692	168,566	175,401	190,756	207,881
129	3	Empire No. 4, ..	"	" "	"	....	183,772	211,085	203,304	255,640	258,322
130	3	Hartford No. 6,	Ashley, ...	" "	"	....	67,580	112,543	116,098	141,307	145,178
131	3	Stanton No. 7, ..	Wilkes Barre, ..	" "	"	....	116,802	161,190	163,483	212,926	217,955
132	3	Sugar Notch No. 9, ...	Sugar Notch, ..	" "	"	....	138,261	150,542	152,758	164,413	166,732
133	3	Sugar Notch No. 10,	" "	" "	"	....	119,315	6,147	6,147	....	....
134	3	Wanamie No. 18,	Newport twp.,	" "	"	....	136,313	137,893	138,659	138,022	139,735
135	3	West End No. 1,	Conyngham twp.,	West End Coal Co., ..	L.& S.and N.& W. B. R. RR.,	127,706	135,044	122,898	128,899	128,732	141,196
136	3	" " No. 2,	Conyngham twp.,	" "	L. &. S R. R.,	30,461	30,836	20,824	21,486	....	....
							4,602,295	4,946,791	4,874,132	5,320,119	5,371,535

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5. Plymouth District.

Map number.	No. of inspector's district.	NAME OF COLLIERY—1884.	Location.	Operator.	Shipping Railroad.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
137	3	Salem, ...	Salem twp., ...	Salem Coal Co.,......	L. &. B. R. R., ...	39,037	42,940	32,506	33,098	10,491	13,832
138	3	Susque'na, No. 3,	W. Nanticoke,..	Susque'na Coal Co.,	" ...	....	150,373	....	190,970	....	146,398
139	3	Avondale, ...	Plymouth twp.,	D. L. & W. R. R. Co.,	" ...	159,638	167,663	148,787	151,190	148,830	172,011
140	3	Chauncey, ...	" "	T. P. Macfarlane,....	" ...	17,703	18,003	17,600	18,420	15,228	15,628
141	3	Gaylord, ...	Plymouth, ...	Gaylord Coal Co.,....	D.&H.,L.&B.R.R.	155,196	163,501	160,527	170,249	173,012	179,356
142	3	Dodson, ...	"	Plymouth Coal Co.,	L. & B. R. R., ...	124,772	134,178	137,906	150,730	186,855	149,189
143	3	Parrish,..........	"	Parrish Coal Co., ...	"	1,334	1,405	140,174	143,249	205,102	209,053
144	3	Lance No. 11, ...	"	Lehigh & W B. C.Co.,	"	....	87,512	130,180	125,482	182,452	182,452
145	3	Not'gham No. 15,	"	" "	"	....	342,688	366,205	371,925	436,922	444,519
146	3	Reynolds No. 16,	"	" "	"	....	133,098	138,222	137,184	142,994	144,994
147	3	Plymouth No. 2,	"	Del.& Hud.CanalCo.,	D.&H.,L.&S.R.R.,	111,896	111,895	20,025	20,025	115,236	115,236
148	3	" " 3,	Plymouth twp.,	" "	D.&H.,L.&B.R.R.	167,378	169,124	192,3 4	193,346	164,839	166,982
149	3	" " 4,	Plymouth, ...	" "	" "	109,783	110,668	104,822	104,822	124,099	124,099
150	3	" " 5,	"	" "	" "	155,459	159,952	176,227	177,674	166,087	168,602
151	3	Boston, ...	Plymouth twp.,	" "	" "	142,890	142,890	149,304	149,304	126,516	126,516
152	3	Kingston No. 1,	Edw'dsville bor.,	Kingston Coal Co., ..	L. & B. R. R., ...	173,618	183,730	187,044	198,082	205,780	217,627
153	3	" " 2,	" "	" " ..	"	259,440	266,441	279,462	290,402	333,796	341,557
154	2	East Boston,.....	Kingston twp., .	W. G. Payne & Co.,..	"	....	117,000	112,871	114,191	99,546	101,655
155	2	Black Diamond,	" "	Haddock & Steel,....	"	84,557	93,631	92,942	104,030	107,965	121,160
156	2	Mill Hollow,.....	Luzerne bor., ..	Thos. Waddell & Co.,	"	55,000	60,000	60,000	68,000	51,912	57,007
157	2	Harry E..........	Kingston twp., .	Wyom. Val. Coal Co.,	"	76,318	88,963	78,000	90,400	62,000	74,000
158	2	Forty Fort, ...	" "	" "	"	88,919	97,970	100,600	118,350	128,000	136,700
159	2	Maltby, ...	Wyoming, ...	Lehigh Val. Coal Co.,	L. V. R. R., ...	31,506	32,219	....	....	....	....
							2,875,460	2,834,850	3,121,183	3,137,602	3,408,651

EASTERN MIDDLE COAL FIELD.

6. Green Mountain District.

160	4	Up. Lehigh No. 2,	Upper Lehigh,..	Up. Lehigh Coal Co.	L. & S. R. R.,....	166,139	182,849	162,650	182,830	170,789	194,138
161	4	" No. 4,	" " ..	" "	" "	168,981	177,317	182,728	190,671	183,950	190,942
162	4	Pond Creek,.....	Pond Creek,....	M. S. Kemmerer,....	" "	47,372	50,750	42,592	45,494	46,332	49,466
						382,492	410,916	387,969	418,985	401,071	434,546

7. Black Creek District.

163	4	Sandy Run,......	Sandy Run,.....	M.S.Kemmerer & Co.	L. & S. R. R.,.....	137,448	147,174	148,253	158,720	133,078	146,344
164	4	Cross Creek No. 1,	Drifton, ...	Coxe Bros. & Co.,...	L. V. and L. & S.,	195,023	238,521	201,631	223,487	453,258	492,582
165	4	" No. 2,	"	" "	" "	168,767	187,777	184,450	202,530		
166	4	" No. 3,	"	" "	" "	1,310	1,878	173	2,228		
167	4	Tomhicken,.....	Tomhicken.	" "	S. H. & W. R. R.,	63,890	69,259	79,184	87,425	75,354	82,460
168	4	Derringer,.......	Derringer,......	" "	" "	73,652	78,974	96,007	102,983	276,022	288,185
169	4	Gowen, ...	Gowen, ...	" "	" "	121,618	127,158	130,224	136,695		
170	4	Highland No. 1,..	Highland, ...	G. B. Markle & Co.,..	L. V. R. R., ...	108,179	116,833	92,143	99,514	128,397	138,668
171	4	" No. 2,..	"	" " ..	"	46,254	54,254	91,027	98,309	126,265	136,366
172	4	Oakdale No. 1,...	Jeddo, ...	" " ..	"	85,595	92,442	88,940	96,055	113,298	122,360
173	4	" No. 2,..	"	" " ..	"	87,656	94,667	95,996	104,675	104,815	113,200
174	4	Council Ridge No. 2, ...	Eckley, ...	Coxe Bros. & Co.,....	L.V.& L.&S.R.R.	130,025	158,495	188,670	205,924	33,012	36,499
175	4	Council Ridge No. 5,..........	"	" "	L. & S. R. R., ...	188,598	196,646	188,855	204,013	125,574	137,637
176	4	Ebervale, ...	Ebervale, ...	Ebervale Coal Co., ..	L. V. R. R., ...	134,703	173,907	115,529	150,559	....	....
177	4	Black Ridge, ...	Conyngham,....	J. S. Wentz & Co.,...	"	....	....	9,581	10,966	52,522	56,723
178	4	Harleigh, ...	Harleigh,.......	Kemmerer & Co.,....	"	82,534	96,302	76,575	86,603	5,780	6,467
179	4	Lattimer No. 1,..	Lattimer, ...	Pardee Bros. & Co.,..	"	69,389	74,939	17,068	21,961	75,855	98,784
180	4	" No. 2,..	"	" " ..	"	75,374	81,404	71,999	79,751		
181	4	" No. 3,..	"	" " ..	"	73,558	79,442	104,399	114,839	94,025	100,497
182	4	Milnesville Nos. 6 and 7,..........	Milnesville, ...	Stout Coal Co.......	"	69,766	79,902	89,464	101,951	100,015	108,016
183	4	Hollywood,......	Hollywood, ...	C. Pardee & Co., ...	"	90,977	100,410	84,607	94,249	110,393	119,804
						2,013,314	2,248,384	2,154,775	2,382,437	2,009,663	2,184,182

ARTH SCI

8. *Hazleton District.*

Map number.	No. of inspector's district.	NAME OF COLLIERY, 1884.	LOCATION.	OPERATOR.	SHIPPING RAILROAD.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
184	4	East Sugar Loaf No. 1, ...	Stockton, ...	Linderm'n,Skeer&Co.	L. V. R. R., ...	56,497	61,490	96,555	104,279	4,545	7,818
185	4	East Sugar Loaf No. 2, ...	"	" "	" "	54,492	59,896	56,550	61,072	80,395	85,219
186	4	East Sugar Loaf No. 3, ...	"	" "	" "	104,086	113,453	110,572	119,417	104,648	110,926
187	4	East Sugar Loaf No. 5, ...	"	" "	" "	111,840	121,859	70,519	76,160	94,814	100,508
188	4	Humboldt, ...	Humboldt, ...	" "	" "	64,989	70,884	73,727	79,624	76,220	80,794
189	4	Hazlebrook, ...	Lumber Yard, ..	J. S. Wentz & Co., ...	" "	18,530	20,295	45,812	50,081	86,065	88,965
190	4	S. Sugar Loaf, ...	Hazleton	A. Pardee & Co., ...	" "	35,578	37,906	....	2,280	52,038	55,278
191	4	Laurel Hill, ...	"	" "	" "	81,973	96,299	48,024	58,915	39,671	46,584
192	4	Hazleton No. 1, ..	"	" "	" "	95,846	106,320	135,383	143,544	113,426	118,691
193	4	" No. 3, ..	"	" "	" "	45,564	50,406	51,870	57,624	65,791	71,726
194	4	" No. 6, ..	"	" "	" "	93,559	108,647	86,673	101,681	116,459	117,809
195	4	Sugar Loaf, ...	"	" "	" "	30,152	35,909	34,109	40,433	....	....
196	4	Cranberry, ...	"	" "	" "	72,182	78,067	106,986	114,980	124,053	188,299
197	4	Crystal Ridge, ...	"	" "	" "	30,035	32,620	8,836	11,400		
198	4	Mt. Pleasant, ...	"	Pardee Sons & Co., ..	" "	129,741	139,181	130,228	146,229	132,925	149,136
						1,024,484	1,129,172	1,057,838	1,167,669	1,041,050	1,116,748

9. *Beaver Meadow District.*

Map number.	No. of inspector's district.	NAME OF COLLIERY, 1884.	LOCATION.	OPERATOR.	SHIPPING RAILROAD.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
199	4	Beaver Meadow,	Beaver Meadow,	Coxe Bros. & Co., ...	L. V. R. R., ...	120,596	127,544	129,384	138,139	181,373	139,324
200	4	Coleraine Nos. 1 and 2, ...	" "	W. T. Carter & Co., ..	"	181,950	169,650	112,000	128,552	86,080	94,846
201	4	Spring Mt. No. 1,	Jeanesville, ...	J. E. Haydon & Co., ..	"	91,089	102,069	109,967	120,567	101,148	112,273

202	4	" " Nos. 4, and 5, ...	"	" " .	"	102,160	113,160	111,759	124,550	135,793	139,768
203	4	Beaver Br'k Nos. 1 and 2, ...	Frenchtown, ...	C. M. Dodson & Co., ..	"	122,175	138,162	143,497	159,115	162,281	178,012
204	4	Spring Br'k No. 5,	Yorktown, ...	Geo. Myers & Co., ...	L. V and L & S ..	81,069	89,925	77,561	94,810	56,069	71,069
205	4	" " No. 6,	" ...	" " ..	L. V. R. R., ...	91,825	101,757	81,112	94,383	95,255	107,260
206	5	Honey Br'k No. 1,	Audenried, ...	Lehigh & W. B. C. C.,	L & S. R, R.	85,558	44,792	58,275	68,947	21,414	27,414
207	4	Audenried No. 2	Tresckow, ...	" "	"	121,592	182,784	94,180	107,657	70,055	71,025
208	5	" No. 4, ..	Audenried, ...	" "	"	158,078	166,142	142,181	150,635	112,902	122,902
209	5	" No. 5, ..	"	" "	"	116,420	123,907	163,771	173,152	122,492	135,492
F	5	Silver Brook, ...	"	Silver Br'k Coal Co.,	L. V. R. R., ...	....	....	....	....	5,500	8,500
						1,172,514	1,310,212	1,223,637	1,360,516	1,142,312	1,257,886

WESTERN MIDDLE COAL FIELD.

10. East Mahanoy District.

210	5	Ellan gowan, ...	Maple Dale, ...	P. & R. C. & I. Co.,	P. & R. R. R., ...	278,377	....	353,724	360,925	384,603	405,603
211	5	Knickerbocker, .	Yatesville, ...	" "	"	165,878	....	205,565	210,365	228,214	240,214
212	5	St. Nicholas, ...	St. Nicholas, ...	" "	"	73,502	....	11	6,011	....	....
213	5	Tunnel Ridge, ...	Mahanoy City, ..	" "	"	79,431	....	25	7,225	....	....
214	5	Elmwood, ...	" ..	" "	"	79,654	....	93.407	98,207	128,661	140,661
215	5	Mahanoy City, ...	" ..	" "	"	103,164	....	128,901	134,901	129,006	145,006
216	5	North Mahanoy,	" ..	" "	"	50,196	....	119,164	123,365	146,825	161,825
217	5	Schuylkill, ...	" ..	" "	" .. .	93,959	....	127,328	131,528	116,946	124,946
218	5	Suffolk, ...	St. Nicholas, ...	" "	"	114,878	....	149,981	154.481	150,869	161,869
219	5	Glendon, ...	Mahanoy City, ..	J. C. Haydon & Co.,	L. V. R. R., ...	113,573	123,941	108,020	118,673	100,709	109,763
220	5	Primrose, ...	" ..	Nevills & Co., ...	"	42,485	....	51,505	52,505	71,079	80,079
221	5	Park No. 1, ...	" ..	Lentz, Lilly & Co., ...	"	....	....	4,967	5,567	2.405	2,740
222	5	Park No. 2, ...	" ..	" " " ...	"	85,798	84,809	85,927	95,927	151,816	171,793
223	7	Middle Lehigh, ..	New Boston, ...	Middle Lehigh C. Co.,	"	100,600	....	126,059	133,623	120,560	127,793
224	5	Buck Mountain,	Mahanoy City, ..	Buck M't'n Coal Co.,	"	1,600	....	80,452	86,530	90,296	90,945
						1,382,595	....	1,635,036	1,719,833	1,821,489	1,963,237

11. West Mahanoy District.

225	6	Alaska shaft, ...	Alaska station, .	P. & R. C. & I. Co.,	P. & R. R. R., ...	167,115	177,142	208,393	210,293	70,408	74,632
226	6	Reliance, ...	Mt. Carmel, ...	" "	"	91,127	96,595	115,204	118,504	97,120	102,947
227	6	Locust Spring, ..	Locust Gap, ...	" "	"	80,507	84,800	108,662	112,262	117,866	124,938
228	6	Merriam, ...	Locust Summit,	" "	"	86,283	91,160	114,649	121,849	161,974	171,692

11. *West Mahanoy District—Continued.*

Map number.	No. of Inspector's district.	NAME OF COLLIERY.	Location.	Operator.	Shipping Railroad.	1884. Shipment—long tons.	1884. Production—long tons.	1885. Shipment—long tons.	1885. Production—long tons.	1886. Shipment—long tons.	1886. Production—long tons.
229	6	Potts, ...	Locust Dale,....	P. & R. C. & I. Co.,	P. & R. R. R.,....	13,331	14,132	2	2	4	4
230	6	Keystone,........	"	" "	"	60,672	64,312	2	8,002	47,567	50,421
231	6	Tunnel, ...	Ashland,........	" "	"	90,119	95,527	126,846	135,546	59,127	62,675
232	6	Bast, ...	Big Mine Run,..	" "	"	82,300	87,247	116,191	123,991	78,728	83,451
233	6	North Ashland,...	Dark Corner,...	" "	"	102,127	108,255	35,568	37,669	67,627	71,684
234	6	Preston Nos. 1, 2,	Girardville,.....	" "	"	58,119	61,607	45,340	51,640	....	....
235	6	Preston No. 3,....	"	" "	"	71,598	75,894	78,718	85,318	88,555	93,868
236	5	Girard, ...	"	" "	"	59,268	....	69,833	73,944	10,149	12,149
237	5	Hammond, ...	"	" "	"	95,795	....	114,142	119,642	124,173	132,173
238	5	Connor, ...	"	" "	"	135,898	....	130,059	132,359	68,494	70,494
239	5	Gir'd Mammoth,	Raven Run, ...	" "	"	66,703	....	67,237	69,637	75,433	75,284
240	5	Turkey Run, ...	Shenandoah,....	" "	"	111,966	....	140,519	144,719	150,007	162,007
241	5	W. Shenandoah,	"	" "	"	107,697	....	117,657	124,257	134,262	142,262
242	5	Shenandoah city,	"	" "	"	139,285	....	198,583	202,183	241,886	261,886
243	5	Plank Ridge, ...	"	" "	"	93,862	....	....	....	....	....
244	5	Indian Ridge,....	"	" "	"	122,163	....	177,498	186,799	198,523	212,523
245	5	Gilberton, ...	Gilberton, ...	" "	"	64,146	....	89,798	94,298	70,284	108,709
246	5	Boston Run, ...	St. Nicholas,....	" "	"	101,398	....	102,649	107,449	96,237	104,237
247	5	Bear Run, ...	"	" "	"	93,313	....	134,255	139,955	132,114	138,114
248	6	Locust Gap, ...	Locust Gap, ...	" "	"	66,424	70,409	55,916	60,716	91,865	97,377
249	6	Monitor, ...	"	" "	"	93,543	99,156	134,328	140,328	142,279	150,815
250	5	Kohinoor, ...	Shenandoah,....	" "	"	122,307	....	168,809	177,209	170,170	182,170
251	5	East Bear Ridge,	Mahanoy Plane,	" "	"	55,388	....	531	831	....	....
252	5	West Bear Ridge,	"	" "	"	45,029	....	....	....	....	....
253	5	Stanton, ...	Malzeville,......	" "	"	53,876	....	51,649	58,249	67,809	75,800
254	6	Mt. Carmel,......	Mt. Carmel,.....	T. M. Righter & Co.,	P.&R.,N.C,&L.V.R	146,379	153,698	126,748	129,634	117,310	124,582
255	6	Black Diamond,	"	Schwenk, Robertson & Co., ...	L. V.&N. C. R.R.,	33,008	34,208	23,305	24,455	....	....
256	6	Morris Ridge,....	Centralia,.......	Isaac May & Co.,....	L. V. R. R., ...	86,112	88,812	102,005	105,685	94,934	97,634
257	6	Bellmore,........	Mt. Carmel,.....	S. S. Bickel & Co., ...	"	97,685	98,484	66,102	66,768	39,403	40,299
258	6	Big Mine Run,...	Big Mine Run,..	Jeremiah Taylor,....	P. & R. R. R.,....	138,657	142,083	146,751	150,275	159,528	163,687

259	6	Hazel Dell, ...	Centralia, ...	L. A. Riley & Co., ...	L. V. R. R., ...	151,984	159,880	178,002	188,112	160,524	174,467
260	6	Centralia, ...	"	" "	"	....	....				
261	6	Logan, ...	"	" "	"	200,790	216,149	199,711	212,316	201,356	217,641
262	6	Continental, ...	"	L. V. C. Co., ...	"	60,132	60,605	....	....	....	....
263	5	Packer No. 1, ...	Colorado, ...	" "	"	33,808	39,018	150	3,284	....	....
264	5	" " 2, ...	Lost Creek, ...	" "	"	122,756	131,882	80,903	89,182	....	2,906
265	5	" " 3, ...	Brownsville, ...	" "	"	117,231	123,681	144,164	152,193	170,391	182,618
266	5	" " 4, ...	Lost Creek, ...	" "	"	201,806	210,608	203,310	214,100	212,074	227,726
267	5	" " 5, ...	Rapahannock, ..	" "	"	....	....	1,882	2,125	63,112	73,036
268	5	Cuyler, ...	Raven Run, ...	S. M. Heaton & Co., ..	P. & R. R. R., ...	130,896	....	25,233	26,333	....	....
269	5	William Penn, ...	Shaft Post-office,	Wm. Penn Coal Co., .	"	232,000	235,000	240,007	242,109	235,000	255,000
270	5	Locust m't'n, ...	Shenandoah, ...	W. J. Lloyd	"	9,850	11,000	13,885	15,016	....	....
271	5	Kehley Run, ...	"	Thomas Coal Co., ...	"	110,288	115,922	108,730	108,888	116,418	119,849
272	5	Cambridge, ...	"	Cambridge Coal Co., .	"	12,607	....	8,981	8,981	6,753	6,953
273	5	N. Laurel Ridge,	Gilberton, ...	S. H. Barrett, ...	"	17,279	17,579	17,529	17,829	30,689	31,039
274	5	S. Laurel Ridge, .	"	"	"	5,493	5,893	16,108	16,408	11,655	11,805
275	5	Lawrence, ...	Mahanoy Plane,	Lawrence & Brown, .	"	79,292	94,509	67,165	96,873	105,669	125,379
276	5	Draper, ...	Gilberton, ...	Oliver Ditson, ...	"	113,448	123,014	130,515	162,354	115,606	128,606
277	5	Ben Franklin, ...	Doutyville, ...	Douty & Baumgar'r,	"	14,442	14,782	....	....	....	....
278	5	Rausch Gap, ...	Valley View, ...	Israel Nye, ...	"	1,831	1,838	....	....	....	....
						4,649,081	....	4,597,402	4,868,790	4,403,081	4,745,564

12. *Shamokin District.*

279	6	N. Franklin No. 1, R. Ash, ...	Trevorton, ...	P. & R. C. & I. Co., ...	P. & R. R. R., ...	33,817	35,846	....	....	....	....
280	6	N. Franklin No. 2, W. Ash, ...	"	" " ...	" "	76,273	80,849	108,709	111,709	111,852	118,563
281	6	Bear Valley, ...	Shamokin, ...	" " ...	" "	83,631	87,983	92,867	90,467	84,307	89,306
282	6	Burnside, ...	Carbon Run, ...	" " ...	" "	64,163	67,840	93,828	97,426	101,910	108,025
283	6	Peerless, ...	Shamokin, ...	" " ...	" "	19,194	20,346	43,072	46,162	62,307	66,045
284	6	Buck Ridge, ...	"	" " ...	" "	6,398	6,782	....	....	....	....
285	6	Greenback, ...	Greenback, ...	" " ...	" "	43,039	45,621	....	....	....	....
286	6	Cameron, ...	Shamokin, ...	Mineral R.R. & M.Co.,	N. C. R. R., ...	207,933	220,954	230,094	245,436	176,461	193,031
287	6	Luke Fidler, ...	"	" " "	"	124,826	129,626	139,846	146,876	104,148	115,728
288	6	Hickory Ridge...	Coal Run, ...	" " "	"	32,017	34,730	41,649	44,855	39,302	43,252
289	6	Hickory Swamp,	Green Ridge, ...	Union Coal Co., ...	"	28,740	30,177	61,250	66,011	63,502	67,842
290	6	Pennsylvania, ...	" ...	" "	"	120,249	146,010	98,641	108,189	217,976	226,976
291	6	Lancaster, ...	Coal Run, ...	Smith & Keiser, ...	"	19,900	20,208	7,770	7,904	7,413	7,623
292	6	Royal Oak, ...	Shamokin, ...	Tillett & Bro., ...	P. & R. R. R., ...	3,119	3,396	3,669	4,279	1,071	1,135
293	6	Sterling, ...	Carbon Run, ...	P. & R. C. & I. Co., ...	" "	104,401	110,665	86,244	86,669	18,314	19,413
294	6	Henry Clay, ...	Shamokin, ...	" " ...	" "	55,629	56,785	....	....	62,063	65,787
295	6	Star, ...	"	Chas. Hutchinson, ...	" "	4,940	5,075	6,615	6,815	....	....

12. Shamokin District—Continued.

Map number.	Number of Inspector's district.	NAME OF COLLIERY—1884.	Location.	Operator.	Shipping railroad.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
296	6	Big Mountain,...	Shamokin, ...	P. & R. C. & I. Co.,...	P. & R. R. R.,....	139,742	141,841	155,570	162,235	....	....
297	6	Excelsior,........	Excelsior, ...	Excelsior Coal M.Co.,	P. & R. and N. C. R. R., ...	137,097	145,322	167,149	177,178	161,424	171,109
298	6	Enterprise, ...	"	Baumgardner & Co.,	P. & R. and N. C. R. R., ...	107,375	112,892	127,367	182,851	103,094	110,726
299	6	Garfield, ...	Shamokin, ...	Garfield Coal Co.,....	P. & R. R. R.,....	4,383	4,601	19,996	20,243	7,998	8,317
300	6	Big M'ntain No. 2, ...	Centralia, ...	John Q. Williams, ...	....	1,255	1,255	....	....	....	....
301	6	Pioneer, ...	Ashland, ...	David Vaughan, ...	....	787	774	....	....	....	....
302	6	McAuley, ...	McAuley, ...	Allen Mann, ...	....	358	353	....	....	....	....
						1,419,211	1,509,981	1,484,274	1,564,305	1,328,442	1,413,838

SOUTHERN COAL FIELD.

13. Panther Creek District.

303	4	Colliery No. 3, ...	Nesquehoning, .	Lehigh C.&N.Co.,....	L. & S. R. R., ...	....	128,185	165,439	....	143,778	170,318
304	4	" " 4, ...	Jamestown, ...	" "	"	....	112,651	144,326	....	146,477	160,194
305	4	" " 5, ...	Andrewsville, ..	" "	"	....	76,080	118,614	....	} 134,805	155,588
306	4	" " 6, ...	" ..	" "	"	....	66,310	24,863	....		
307	7	" " 8, ...	Coaldale, ...	" "	"	....	107,613	135,065	....	135,996	144,049
308	4	" " 9, ...	"	" "	"	....	112,152	142,178	....	159,462	172,217
309	7	" " 10, ...	Bull Run,.......	" "	"	....	124,115	154,117	....	164,760	174,645
310	7	" " 11, ...	"	" "	"	....	102,187	124,964	....	112,058	118,776

311	7	" " 12, ...	Coaldale, ...	" "	"	....	89,430	91,405	....	96,204	101,976
312	7	" " 13, ...	Tamaqua, ...	" "	"	....	80,550	19,114	....	20,193	21,404
	7	Leased mines, ...	"	" "	....	....	9,621	7,221	....	....	....
							958,844	1,127,291	1,224,468	1,113,028	1,219,167

14. East Schuylkill District.

313	7	Beechwood, ...	Mt. Laffee, ...	P. & R. C. & I. Co., ..	P. & R. R. R., ...	195	....	13,856	18,657	60,442	64,068
314	7	Wadesville shaft,	Wadesville, ...	" " ..	"	29,555	....	6	6,008	....	....
315	7	Pottsville, ...	Pottsville, ...	" " ..	"	12,459	....	2,152	5,152	....	....
316	7	Pine Forest, ...	St. Clair, ...	" " ..	"	31,090	....	25	6,025	....	....
317	7	Eagle Hill shaft,	Cumbola, ...	" " ..	"	82,295	....	142,028	149,827	215,175	228,657
318	7	Eagle, ...	St. Clair, ...	" " ..	"	84,319	....	45,904	47,704	40,819	42,738
319	7	Repplier, ...	New Castle, ...	John F. Quinn & Co.,	"	3,604	....	4,804	5,092	1,070	1,184
320	7	Monitor, ...	Wadesville, ...	John Denning, ...	"	6,500	....	4,700	4,982	6,580	6,974
321	7	Cumdee, ...	"	John Mullin & Co., ..	"	1,854	....	....	....	....	....
322	7	Hooker, ...	St. Clair, ...	Thomas Wren & Co.,	"	3,136	....	4,669	4,949	8,650	9,169
323	7	Palmer Vein, ...	New Philadel'a,	Alliance Coal M. Co.,	"	61,812	....	48,844	51,775	425	450
324	7	Kaska William, .	Middleport, ...	" "	"	52,300	....	101,823	107,932	159,083	168,628
325	7	Coal Hill, ...	Blythe twp., ...	William Basler, ...	"	979	....	....	....	....	....
326	7	East Lehigh, ...	Tamaqua, ...	Mitchell & Shepp, ...	"	3,805	....	4,150	4,399	4,683	4,964
327	7	Pine Dale, ...	Middleport, ...	Slemmer & Co., ...	"	....	....	9,175	9,726	11,148	11,816
328	7	Ebony, ...	New Castle, ...	Bowman & Co., ...	"	5,077	....	....	....	....	....
329	7	Peach Orchard, ..	Wadesville, ...	Evans & Geisweit, ...	"	1,517	....	....	....	....	....
330	7	Sharp Mountain,	Pottsville, ...	Thos. Wren, ...	....	67	....	....	....	....	....
331	7	Oak Hill, ...	Mt. Laffee, ...	"	....	6,726	....	....	....	....	....
332	7	New Castle, ...	New Castle, ...	B. F. Palm & Son, ..	....	860	....	....	....	....	....
333	7	Tamaqua, ...	Tamaqua, ...	Draper & Wittich, ...	....	....	....	2,006	2,126	....	....
334	7	Shelly, ...	Minersville, ...	Shelly & Confair, ...	....	554	....	....	....	....	....
G	7	Chamberlain, ...	St. Clair, ...	Thompson & Co., ...	....	....	....	....	....	21,102	22,368
H	7	Milford, ...	Middleport, ...	Docker & Bowman, .	....	....	....	....	....	1,081	1,145
						337,706	....	384,140	424,352	529,758	562,111

15. West Schuylkill District.

335	7	Otto, ...	Branchdale, ...	P. & R. C. & I. Co., ...	P. & R. R. R., ...	56,078	....	55,129	64,579	69,301	73,459
336	7	Phœnix Park, No. 3, ...	Phœnix Park, ..	" " "	" "	37,642	....	55,507	59,707	47,078	49,897
337	7	Forestville, ...	Forestville, ...	" " "	" "	37,084	....	440	540	....	....
338	7	Glendower, ...	Glendower, ...	" " "	" "	41,558	....	45,672	55,672	77,800	82,468

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15. *West Schuylkill District—Continued.*

Map number.	No. of inspector's district.	NAME OF COLLIERY, 1884.	LOCATION.	OPERATOR.	SHIPPING RAILROAD.	1884.		1885.		1886.	
						Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.	Shipment—long tons.	Production—long tons.
339	7	Richardson,......	Glen Carbon, ...	P. & R. C. & I. Co.,...	P. & R. R. R.,....	72,498	....	102,431	111,131	99,048	104,990
340	7	Thomaston,......	Heckschersville,	" " "	" "	100,229	....	130,392	138,392	107,515	113,965
341	7	Wood,............	Swatara, ...	C. Wood,.............	" "	1,600	....	....	....	....	....
342	7	Peach Mountain,	Minersville,.....	W. H. Harris,........	" "	2,040	975	1,034	....	....	....
343	7	Herbine, ...	"	J. K. Seigfried, ...	" "	37,731	....	35,203	37,315	35,506	37,696
344	7	Wolf Creek Big Diamond, ...	"	J. F. Donahue, ...	" "	1,567	....	....	....	....	....
345	7	Little Diamond,.	"	J. Lawrence,.........	" "	2,941	....	3,000	3,180	2,490	2,639
346	7	Ellsworth, ...	New Castle,.....	John R. Davis........	" "	12,149	....	12,447	13,194	8,062	8,545
347	7	Black Valley,....	Minersville,....	Edward Hoskins,....	" "	1,273	....	....	....	....	....
348	7	Jugular, ...	New Castle,.....	J. S. Hepner,........	" "	1,129	....	....	....	....	....
349	7	Crystal, ...	"	Joseph Brady, ...	" "	5,977	....	4,604	4,880	5,344	5,664
350	7	Kirkline, ...	Thomaston,.....	P. O. Connor, ...	" "	3,671	....	5,800	6,148	3,500	3,710
351	7	Newtown,........	Newtown,.......	Miesse, Diggles & Co.,	" "	497	....	....	....	3,000	3,180
352	7	Mine Hill Gap,...	Minersville,.....	P. & R. C. & I. Co.,...	" "	68,596	....	4	4	....	....
353	7	Swatara No. 2, ...	Swatara, ...	John D. Felty, ...	" "	1,426	....	....	....	....	....
354	7	....	....	Dix & Edwards,......	....	108	....	....	....	....	....
						485,729	....	451,604	495,776	458,639	486,153

16. *Lorberry District.*

Map number.	No. of inspector's district.	NAME OF COLLIERY, 1884.	LOCATION.	OPERATOR.	SHIPPING RAILROAD.	1884. Shipment—long tons.	1884. Production—long tons.	1885. Shipment—long tons.	1885. Production—long tons.	1886. Shipment—long tons.	1886. Production—long tons.
355	7	Colket, ...	Donaldson, ...	P. & R. C. & I. Co.,...	P. & R. R. R.,...	33,369	....	26	26	....	....
356	7	East Franklin,...	Upper Rausch Creek,.........	" " "	" "	93	....	5,590	10,991	7,196	7,626
357	7	Middle Creek Shaft, ...	Middle Creek,...	" " "	" "	58,856	....	70,406	77,006	73,077	77,461
358	7	Rausch Creek, ...	Tremont twp., ..	" " "	" "	3,754	....	6	4,278	....	....
						96,072	....	76,028	92,301	80,272	85,087

17. *Lykens Valley District.*

359	7	West Brookside, .	Porter township,	P. & R. C. & I. Co., …	P. & R. R. R., …	320,000	839,200	200,471	302,471	274,817	291,306
360	7	Kalmia, ……….	Orwin, ……….	" " "	" "	72,206	……….	88,571	88,071	74,302	78,760
361	7	Lincoln, ……….	Tremont twp., ..	" " "	" "	69,155	……….	96,368	102,868	125,017	138,154
362	7	New Lincoln, ….	Frailey twp., ….	Levi Miller & Co., ….	" "	49,081	……….	154,307	163,566	154,566	163,833
363	6	Williamstown, …	Williamstown, ..	Summit Br. R. R. Co.,	N. C. R. R., ……	350,128	389,917	314,575	344,480	167,817	193,799
364	6 6	Short Mountain, . Lykens Valley, ..	Lykenstown, … " …	Lykens Valley C. Co., " " "	" …. " ….	185,923	212,062	189,579	217,174	175,833	214,065
365	6	Big Run Gap, …	Williams Valley,	James Fennel, …….	…… …… ……	1,940	1,940	……….	……….	……….	……….
						1,057,433	……….	1,181,871	1,219,030	972,952	1,074,917

LOYALSOCK FIELD.

18. *Loyalsock District.*

366	2	Bernice, ………	[illegible]	S. L. & S. R. R. Co., ..	L. V. R. R., ……	84,551	86,018	73,117	75,011	59,331	61,767

Table of Areas.

No exact determination has been made of the area of the different anthracite coal basins. The general estimates contained in the following table will serve to give an idea as to their relative size:

Area and total production of individual coal fields.

FIELD.	Square miles (approximate).	1882.		1883.		1884.		1885.		1886.	
		Tons.	Percentage.	Tons.	Percentage.	Tons.	Percentage.	Tons.	Percentage.	Tons.	Percentage.
Northern,	200	14,945,096	47.66	16,570,424	48.80	16,411,277	50.28	17,215,066	50.29	18,247,875	52.36
Southern,	140	2,838,370	9.05	3,161,719	9.31	3,149,471	9.65	3,455,927	10.10	3,427,435	9.83
Western Middle,	90	8,183,509	26.09	8,552,915	25.19	7,896,049	24.19	8,152,937	23.82	8,122,639	23.30
Eastern Middle,	40	5,314,091	16.95	5,586,397	16.45	5,098,684	15.62	5,329,607	15.57	4,993,361	14.33
Western Northern,	Unknown.	77,198	0.25	84,876	0.25	86,018	0.26	75,011	0.22	61,767	0.18
Totals,	470+	31,358,264	100.00	33,955,831	100.00	32,641,499	100.00	34,228,548	100.00	34,853,077	100.00

Total production and shipment from the Inspectors' districts for the years 1885 and 1886 with the colliery and local consumption.

Number of district under law of June 30, 1885.	Name of Inspector.	1885.			1886.		
		Shipment.	Colliery and local consumption.	Total production.	Shipment.	Colliery and local consumption.	Total production.
		Long tons.	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*
First,	Patrick Blewitt,	6,829,977	428,776	7,258,753	6,631,228	481,033	7,112,259
Second,	Hugh McDonald,	3,686,695	161,854	3,848,549	4,143,575	116,498	4,260,073
Third,	G. M. Williams,	6,036,884	145,891	6,182,775	6,692,552	244,758	6,937,310
Fourth,	James E. Roderick,	5,055,407	528,209	5,583,616	4,916,310	441.060	5,357,370
Fifth,	William Stein,	4,493,075	276,005	4,769,080	4,570,145	402,356	4,972,501
Sixth,	James Ryan,	3,965,959	238,663	4,204,622	3,463,265	261,252	3,724,517
Seventh,	Samuel Gay,	2,197,424	183,729	2,381,153	2,347,637	141,410	2,489,047
Total production of all anthracites		32,265,421	1,963,127	34,228,548	32,764,710	2,088,367	34,853,077

Inspection districts.

The region is divided into seven inspection districts, as follows:

First. That portion of the Wyoming coal field included in the counties of Lackawanna, Wayne and Susquehanna.

Second. The county of Sullivan and that portion of the Wyoming coal field situated in Luzerne county east of and including Plains and Kingston townships.

Third. The remaining portion of the Wyoming coal field west of Plains and Kingston townships, including the city of Wilkes Barre and the boroughs of Kingston and Edwardsville.

Fourth. That part of Luzerne county lying south of the Wyoming coal field, together with Carbon county.

Fifth. That part of the Schuylkill coal field in Schuylkill county lying north of the Broad mountain and east of a meridian line through the center of the borough of Girardville.

Sixth. That part of the Schuylkill coal field in Schuylkill county lying north of the Broad mountain and west of a meridian line through the center of the borough of Girardville, together with Columbia, Northumberland and Dauphin counties.

Seventh. All that part of the Schuylkill coal field in Schuylkill county lying south of the Mahanoy valley and the county of Lebanon.

The shipment of coal from the three prominent coal fields into which the region has been divided by the transportation companies from the commencement of mining in 1820 has been carefully reported on by Mr. P. W. Shaefer and subsequently by Mr. John H. Jones, from whose reports the following table has been compiled.

Annual shipments of Anthracite coal in Pennsylvania since 1820, with the number of tons and percentage shipped for each region.

YEARS.	Schuylkill region.		Lehigh region.		Wyoming region.		Total.
	Long tons.	*Per ct.*	*Long tons.*	*Per ct.*	*Long tons.*	*Per ct.*	*Long tons.*
1820,	....	.....	365	.....	....	.....	365
1821,	....	.....	1,073	.....	....	.....	1,073
1822,	1,480	39.79	2,240	60.21	....	.....	3,720
1823,	1,128	16.23	5,823	83.77	....	.....	6,951
1824,	1,567	14.10	9,541	85.90	....	.....	11,108
1825,	6,500	18.60	28,393	81.40	....	.....	34,893
1826,	16,767	34.90	31,280	65.10	....	.....	48,047
1827,	31,360	49.44	32,074	50.56	....	.....	63,434
1828,	47,284	61.00	30,232	39.00	....	.....	77,516
1829.	79,973	71.35	25,110	22.40	7,000	6.25	112,083
1830,	89,984	51.50	41,750	23.90	43,000	24.60	174,734
1831,	81,854	46.29	40,966	23.17	54,000	30.54	176,820
1832,	209,271	57.61	70,000	19.27	84,000	23.12	363,271
1833,	252,971	51.87	123,001	25.22	111,777	22.91	487,749
1834,	226,692	60.19	106,244	28.21	43,700	11.60	376,636
1835,	339,508	60.54	131,250	23.41	90,000	16.05	560,758
1836.	432,045	63.16	148,211	21.66	103,861	15.18	684,117
1837,	530,152	60.98	223,902	25.75	115,387	13.27	869,441
1838,	446,875	60.49	213,615	28.92	78,207	10.59	738,697
1839,	475,077	58.06	221,025	27.01	122,300	14.94	818,402
1840,	490,596	56.75	225,313	26.07	148,470	17.18	864,379
1841,	624,466	65.07	143,037	14.90	192,270	20.03	959,773
1842,	583,273	52.62	272,540	24.59	252,599	22.79	1,108,412
1843,	710,200	56.21	267,793	21.19	285,605	22.60	1,263,598
1844,	887,937	54.45	377,002	23.12	365,911	22.43	1,630,850
1845,	1,131,724	56.22	429,453	21.33	451,836	22.45	2,013,013
1846,	1,308,500	55.82	517,116	22.07	518,389	22.11	2,344,005
1847,	1,665,735	57.79	633,507	21.98	583,067	20.23	2,882,309
1848,	1,733,721	56.12	670,321	21.70	685,196	22.18	3,089,238
1849,	1,728,500	53.30	781,556	24.10	732,910	22.60	3,242,966
1850,	1,840,620	54.80	690,456	20.56	827,823	24.64	3,358,899
1851,	2,328,525	52.34	964,224	21.68	1,156,167	25.98	4,448,916
1852,	2,636,835	52.81	1,072,136	21.47	1,284,500	25.72	4,993,471
1853,	2,665,110	51.30	1,054,309	20.29	1,475,732	28.41	5,195,151
1854,	3,191,670	53.14	1,207,186	20.13	1,603,478	26.73	6,002,334
1855,	3,552,943	53.77	1,284,113	19.43	1,771,511	26.80	6,608,567
1856,	3,603,029	52.91	1,351,970	19.52	1,972,581	28.47	6,927,580
1857,	3,373,797	50.77	1,318,541	19.84	1,952,603	29.39	6,644,941
1858,	3,273,245	47.86	1,380,030	20.18	2,186,094	31.96	6,839,369
1859,	3,448,708	44.16	1,628,311	20.86	2,731,236	34.98	7,808,255
1860,	3,749,632	44.04	1,821,674	21.40	2,941,817	34.56	8,513,123
1861,	3,160,747	39.74	1,738,377	21.85	3,055,140	38.41	7,954,264
1862,	3,372,583	42.86	1,351,054	17.17	3,145,770	39.97	7,869,407
1863,	3,911,683	40.90	1,894,713	19.80	3,759,610	39.30	9,566,006
1864,	4,161,970	40.89	2,054,669	20.19	3,960,836	38.92	10,177,475
1865,	4,356,959	45.14	2,040,913	21.14	3,254,519	33.72	9,652,391
1866,	5,787,902	45.56	2,179,364	17.15	4,736,616	37.29	12,703,882
1867,	5,161,671	39.74	2,502,054	19.27	5,325,000	40.99	12,988,725
1868,	5,330,737	38.62	2,502,582	18.13	5,968,146	43.25	13,801,465
1869,	5,775,138	41.66	1,949,673	14.06	6,141,369	44.28	13,866,180
1870,	4,968,157	30.70	3,239,374	20.02	7,974,660	49.28	16,182,191
1871,	6,552,772	41.74	2,235,707	14.24	6,911,242	44.02	15,699,721
1872,	6,694,890	34.03	3,873,339	19.70	9,101,549	46.27	19,669,778
1873,	7,212,601	33.97	3,705,596	17.46	10,309,755	48.57	21,227,952
1874,	6,866,877	34.09	3,773,836	18.73	9,504,408	47.18	20,145,121
1875,	6,281,712	31.87	2,834,605	14.38	10,596,155	53.75	19,712,472
1876,	6,221,934	33.63	3,854,919	20.84	8,424,158	45.53	18,501,011
1877,	8,195,042	39.35	4,332,760	20.80	8,300,377	39.85	20,828,179
1878,	6,282,226	35.68	3,237,449	18.40	8,085,587	45.92	17,605,262
1879,	8,960,829	34.28	4,595,567	17.58	12,586,293	48.14	26,142,689
1880,	7,554,742	32.23	4,463,221	19.05	11,419,279	48.72	23,437,242
1881,	9,253,958	32.46	5,294,676	18.58	13,951,383	48.96	28,500,017
1882,	9,459,288	32.48	5,689,437	19.54	13,971,371	47.98	29,120,096
1883,	10,074,726	31.69	6,113,809	19.23	15,604,492	49.08	31,793,027
1884,	9,478,314	30.85	5,562,226	18.11	(a) 15,677,753	51.04	30,718,293
1885,	9,488,426	30.01	5,898,634	18.65	(a) 16,236,470	51.34	31,623,530
1886,	9,381,407	29.19	5,723,129	17.81	(a) 17,031,826	53.00	32,136,362
Total,	221,746,545	37.33	112,218,366	18.90	260,006,791	43.77	593,971,702

(*a*.) Includes Loyalsock field.

Total production of Anthracite Coal since 1820.

	Long Tons.
Total shipment 1820 to 1882, Sheafer & Jones, ...	**438,580,394**
Estimated local and colliery consumption, 1820 to 1882,	**39,472,235**
Production reported by Mine Inspectors, 1882, ...	**31,281,066**
" " " " " 1883, ...	**33,955,831**
" " " " " 1884, ...	**32,641,499**
" " " " " 1885, ...	**34,228,548**
" " " " " 1886, ...	**34,853,077**
Total production from 1820 to 1887, ...	**645,012,650**

Under the head of Lehigh region in the above table is included the eastern end of the Southern or Pottsville coal basin between Tamaqua and Mauch Chunk. In this district which is known as the Panther Creek Coal basin, the development of the region first commenced and until 1828 more than one-half of the anthracite production of the entire region came from this basin.

From 1828 to 1857, inclusive, the Schuylkill region, including the Southern coal-field, west of Tamaqua, and the Western Middle Coal-field, produced more than one-half of all the coal mined, and until 1867 this same region produced more than either one of the other two regions. In 1868 the Wyoming region took its rank as the greatest producer of the three regions, and has maintained it until now.

Since 1883, the Wyoming region, which in the above table is made to include the Lackawanna district, has produced more than one-half of the total anthracite mined.

The number of tons of coal and the percentage of the entire product mined by each of the different operating coal companies and individuals in each field and the number of tons and the precentage of the entire production handled by the different transportation companies from these same fields are shown in the following tables:—

Railroad and colliery division of production of individual coal fields for 1885 and 1886.
Northern Coal Field, Railroad Division.

RAILROAD.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Delaware, Lackawanna and Western, main line,	2,596,180	36.51	2,568,525	37.68
Delaware, Lackawanna and Western, Lackawanna and Bloomsburg division,	3,688,617		4,307,516	
Delaware and Hudson Canal Company,	2,584,907	15.02	2,797,648	15.33
Delaware and Hudson Canal Company and Lackawanna and Bloomsburg division of Delaware, Lackawanna and Western railroad,	795,395	4.62	765,645	4.20
Delaware and Hudson Canal Company, and Lehigh and Susquehanna,	253,745	1.47	280,807	1.54
Delaware and Hudson Canal Company and Lehigh Valley,	52,996	0.31	77,633	0.42
Lehigh and Susquehanna,	2,436,495	14.15	2,442,697	13.39
Lehigh and Susquehanna, and North and West branch,	128,899	.75	141,198	0.77
Lehigh Valley,	1,452,254	8.43	1,754,870	9.62
North and West branch (Pennsylvania),	1,275,765	7.41	1,485,474	8.14
Pennsylvania Coal Company,	1,304,932	7.58		
Erie and Wyoming Valley,	517,718	3.00	1,454,880	7.97
New York, Lake Erie and Western (Jefferson Branch),	96,629	.56	135,144	0.74
Local sales (shipped by wagon),	33,534	.19	35,840	0.20
Total,	17,215,066	100.00	18,247,875	100.00

Northern Coal Field, Colliery Division.

OPERATOR.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Delaware, Lackawanna and Western,	2,168,017	12.60	2,453,699	13.45
Delaware and Hudson Canal Company,	3,048,237	17.70	3,220,237	17.65
Delaware and Hudson and Delaware, Lackawanna and Western,	192,176	1.12	159,478	.88
Lehigh and Wilkesbarre Coal Company,	1,716,682	9.97	2,044,370	11.20
Susquehanna Coal Company,	1,466,735	8.51	1,631,860	8.94
Lehigh Valley Coal Company,	830,755	4.83	1,016,972	5.57
Pennsylvania Coal Company,	1,711,379	9.94	1,357,708	7.44
Hillside Coal and Iron Company,	371,867	2.16	438,204	2.40
Individual operators,	5,709,218	33.17	5,925,147	32.47
Total,	17,215,066	100.00	18,247,875	100.00

Eastern Middle Coal Field, Railroad Division.

RAILROAD.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Lehigh Valley,	2,991,416	56.12	2,938,706	58.85
Lehigh and Susquehanna,	1,282,109	24.06	946,223	18.95
Lehigh Valley and Lehigh and Susquehanna,	728,979	13.67	737,787	14.78
Sunbury, Hazleton and Wilkesbarre,	327,103	6.15	370,645	7.42
Total,	5,329,607	100.00	4,993,361	100.00

Eastern Middle Coal Field, Colliery Division.

OPERATOR.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Lehigh and Wilkesbarre Coal Company,	500,391	9.39	356,833	7.15
Individual operators,	4,829,216	90.61	4,636,528	92.85
Total,	5,329,607	100.00	4,993,361	100.00

Western Middle Coal Field, Railroad Division.

RAILROAD.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Philadelphia and Reading,	5,525,749	67.78	5,461,415	67.24
Philadelphia and Reading and Northern Central,	330,272	4.05	281,835	3.47
Lehigh Valley,	1,523,256	18.68	1,599,455	19.69
Northern Central,	619,271	7.60	655,352	8.07
Lehigh Valley and Northern Central,	24,455	0.30		
Philadelphia and Reading, Northern Central and Lehigh Valley,	129,934	1.59	124,582	1.53
Total,	8,152,937	100.00	8,122,639	100.00

Western Middle Coal Field, Colliery Division.

Operator.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Philadelphia and Reading Coal and Iron Company,	4,417,421	54.18	4,609,645	56.75
Lehigh Valley Coal Company,	460,814	5.65	486,301	5.99
Mineral Railroad and Mining Company,	437,167	5.36	352,911	4.35
Individual operators,	2,837,535	34.81	2,673,782	32.91
Total,	8,152,937	100.00	8,122,639	100.00

Southern Coal Field, Railroad Division.

Railroad.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Philadelphia and Reading,	1,669,805	48.33	1,800,404	52.53
Lehigh and Susquehanna,	1,224,468	35.44	1,219.167	35.57
Northern Central,	561,654	16.23	407,864	11.90
Total,	3,455,927	100.00	3,427,435	100.00

Southern Coal Field, Colliery Division.

OPERATOR.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Philadelphia and Reading Coal and Iron Company,	1,249,503	36.15	1,348,549	39.35
Lehigh Coal and Navigation Company,	1,224,468	35.43	1,219,167	35.57
Summit Branch Railroad Company,	344,480	9.97	193,790	5.65
Lykens Valley Coal Company,	217,174	6.28	214,065	6.25
Individual operators,	420,302	12.17	451,855	13.18
Total,	3,455,927	100.00	3,427,435	100.00

Western Northern Coal Field, Railroad Division.

RAILROAD.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
Lehigh Valley,	75,011	100.00	61,767	100.00

Western Northern Coal Field, Colliery Division.

OPERATOR.	1885.		1886.	
	Long tons.	Percentage.	Long tons.	Percentage.
State Line and Sullivan Railroad Company,	75,011	100.00	61,767	100.00

Railroad division of production of Anthracite coal for 1885 and 1886.

RAILROAD.	1885.		1886.	
	Tons.	Percentage.	Tons.	Percentage.
Philadelphia and Reading Railroad,	7,195,554	21.02	7,261,819	20.84
Delaware, Lackawanna and Western Railroad,	6,281,797	18.36	7,822,264	22.44
Lehigh Valley Railroad,	6,041,937	17.66	6,354,798	18.23
Central Railroad of New Jersey,	4,943,072	14.44	3,661,864	10.51
Pennsylvania Railroad,	2,783,798	8.13	2,919,386	8.38
Delaware and Hudson Canal Company,	2,584,907	7.55	2,797,648	8.03
Pennsylvania Coal Company,	1,304,862	3.81		
Delaware and Hudson Canal Company and Delaware, Lackawanna and Western Railroad,	795,395	2.32	765,645	2.20
Lehigh Valley Railroad and Central Railroad of New Jersey,	728,979	2.13	737,787	2.12
Erie and Wyoming Valley Railroad,	517,718	1.51	1,454,880	4.17
Philadelphia and Reading Railroad and Pennsylvania Railroad,	330,272	.97	281,835	.81
Delaware and Hudson Canal Company and Central Railroad of New Jersey,	253,745	.74	280,807	.80
Philadelphia and Reading Railroad, Pennsylvania Railroad, and Lehigh Valley Railroad,	129,934	.38	124,582	.36
Central Railroad of New Jersey and Pennsylvania Railroad,	128,899	.37	141,196	.40
Jefferson Branch, New York, Lake Erie and Western Railroad,	96,629	.28	135,144	.39
Delaware and Hudson Canal Company and Lehigh Valley Railroad,	52,996	.16	77,638	.22
Lehigh Valley Railroad and Pennsylvania Railroad,	24,455	.07		
Local sales (shipped by wagon),	33,584	.10	35,840	.10
Totals,	34,228,548	100.00	34,853,077	100.00

The number of tons of coal and the percentage of the total product shipped by the different transportation companies, individually and by two or more companies combined, are shown in the following table. These statistics are generally published in the coal trade journals in a table in which a fixed tonnage is assigned to each independent company. This is not strictly correct since a number of the railroads collect from the colleries a certain amount of coal which goes to market by short lines belonging to other transportation companies. With this explanation the preceding table will be perfectly understood.

All of the transportation companies in the region, however, have relations with coal operating companies or with individual operators, by which the shipment of coal from the collieries of this company and individual operators are shipped exclusively over the respective lines controlled by the different transportation companies. The total production of coal from these collieries is given in the following tables:

Colliery division of production, Anthracite coal for 1885 and 1886.

	1885.		1886.	
	Tons.	Percentage.	Tons.	Percentage.
Individual operators,	13,796,271	40.31	13,687,512	39.27
Philadelphia and Reading Coal and Iron Co.,	5,666,924	16.56	5,958,194	17.07
Delaware and Hudson Canal Co.,	3,048,237	8.90	3,220.237	9.24
Pennsylvania Railroad Coal Co.'s,	2,465,556	7.20	2,392,635	6.87
Lehigh and Wilkes-Barre Coal Co.,	2,217,073	6.48	2,401,203	6.90
Delaware, Lackawanna & Western R. R. Co.,	2,168,017	6.33	2,453,699	7.04
Pennsylvania Coal Co.,	1,711,379	5.00	1,357,708	3.90
Lehigh Valley Coal Co.,	1,291,569	3.77	1,503,273	4.31
Lehigh Coal and Navigation Co.,	1,224,468	3.58	1,219,167	3.50
Hillside Coal and Iron Co.,	371,867	1.09	438,204	1.26
D. and H. Can. Co. and D., L. and W. R. R. Co.,	192,176	.56	159,478	.46
State Line and Sullivan Railroad Co.,	75,011	.22	61,767	.18
	34,228,548	100.00	34,853,077	100.00

. The number of tons of coal transported by each of the different railroad companies from 1870 to 1886, inclusive, is shown in the following table:

Railroad divison of shipments, 1870 to 1886, inclusive.

TRANSPORTING COMPANIES.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.
Philadelphia and Reading R. R. Co.,*	4,169,707	5,330,863	5,645,103	5,868,848	5,568,601	4,782,311	4,931,754	6,842,105	5,112,219
Lehigh Valley R. R. Co.,	3,608,587	2,880,263	3,850,118	4,121,734	3,989,821	3,285,225	3,985,351	4,447,881	3,403,318
Central R. R. Co. of New Jersey,*	1,606,469	1,985,550	2,253,614	2,698,119	2,706,007	2,465,902	2,778,096	2,887,500	2,264,979
Del., Laka & West. R. R. Co.,	2,117,612	1,730,242	2,520,330	2,952,941	2,353,539	2,833,670	1,998,654	2,089,523	2,180,673
Delaware and Hudson Canal Co.,	2,318,073	1,955,737	2,882,479	2,732,287	2,290,791	2,843,229	1,809,190	1,787,470	2,046,235
Pennsylvania R. R. Co.,	1,225,733	912,835	1,168,084	1,519,711	1,642,474	1,772,719	1,623,335	1,580,594	1,362,674
Pennsylvania Coal Co.,	1,136,010	848,635	1,266,762	1,297,604	1,396,326	1,426,377	1,143,922	1,118,011	957,082
N. Y., L. E. & W. R. R.,	....	55,596	83,288	36,728	197,562	303,039	230,709	175,095	278,182
Total,	16,182,191	15,699,721	19,669,778	21,227,952	20,145,121	19,712,472	18,501,011	20, 828,179	17,605,362

TRANSPORTING COMPANIES.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Philadelphia and Reading R. R. Co.,*	7,442,617	5,933,923	6,940,283	7,000,113	12,282,402	11,163,920	11,680,780	11,690,483
Lehigh Valley R. R. Co.,	4,405,958	4,394,583	5,721,870	5,933,740	6,271,778	5,935,254	6,107,445	6,184,456
Central R. R. Co. of New Jersey,*	3,825,553	3,470,141	4,065,424	4,211,052				
Del., Lacka & West. R. R. Co.,	3,867,405	3,550,348	4,348,970	4,638,717	5,079,123	5,204,362	4,987,834	5,172,023
Delaware and Hudson Canal Co.,	3,014,117	2,674,705	3,211,498	3,203,168	3,512,971	3,362,680	3,301,873	3,480,687
Pennsylvania R. R. Co.,	1,682,106	1,864,032	2,211,863	2,332,974	2,773,419	3,169,287	3,393,685	3,478,885
Pennsylvania Coal Co.,	1,427,150	1,138,466	1,475,380	1,469,821	1,541,145	1,397,946	1,500,686	1,398,179
N. Y., L. E. & W. R. R.,	477,783	411,044	465,230	330,511	382,194	484,844	651,226	731,649
Total,	26,142,689	23,437,242	28,500,016	29,120,096	31,793,027	30,718,293	31,623,529	32,136,362

* From June, 1883, to December, 1886, inclusive, the tonnage of the Central Railroad of New Jersey is included in that of the Philadelphia and Reading Railroad Company.

The distribution of the shipments of anthracite coal by the different railroad companies from 1882 to 1885 is shown in the following table:

Distribution of Shipments.

	1882.		1883.		1884.		1885.	
	Tons.	Percentage.	Tons.	Percentage.	Tons.	Percentage.	Tons.	Percentage.
To Pennsylvania, New York and New Jersey,...	19,957,789	68.54	21,830,504	68.66	20,656,297	67.24	21,132,179	66.82
" New England States, ...	5,064,775	17.39	5,387,700	16.95	5,112,825	16.64	5,172,964	16.36
" Western States, ...	2,213,107	7.60	2,537,174	7.98	2,736,099	8.90	3,029,385	9.58
" Southern States, including Del., Md. and D. C.,	1,168,730	4.01	1,284,093	4.04	1,336,070	4.35	1,362,500	4.31
" Pacific coast,..................................	49,065	0.17	24,635	0.08	8,839	0.03	10,700	0.03
" Dominion of Canada, ...	616,875	2.12	690,498	2.17	837,135	2.73	878,177	2.78
" Foreign ports,...................	49,735	0.17	38,423	0.12	30,978	0.11	37,624	0.12
Total, ...	29,120,076	100.00	31,793,027	100.00	30,718,293	100.00	31,623,529	100.00

The county boundaries of that portion of the State in which the Anthracite region is located, are not recognized by the coal trade in the classification of either the coal-fields, or the coals which they produce. Neither are they recognized as distinct counties in the division of the field into inspector's districts. The production of coal, however, in the individual counties is of interest in showing the relative importance of the anthracite mining industry, to the counties in which it is located. This production is shown in the following table:

Total production of the coal fields by counties.

NAME OF COUNTY.	1882.		1883.		1884.		1885.		1886.	
	Production.	Percentage.	Production.	Percentage.	Production.	Percentage.	Production.	Percentage.	Production.	Percentage.
Luzerne,	13,318,084	42.47	14,176,487	41.75	13,382,912	41.00	14,329,645	41.86	14,928,206	42.83
Schuylkill,	7,176,488	22.88	7,758,811	22.85	7,105,532	21.96	7,700,005	22.49	7,915,650	22.71
Lackawanna,	6,108,948	19.48	7,022,241	20.68	7,093,110	21.73	7,174,294	20.96	7,275,858	20.88
Northumberland,	2,545,333	8.12	2,497,801	7.36	2,331,108	7.14	2,482,044	7.25	2,260,822	6.49
Carbon,	867,505	2.77	1,007,419	2.97	1,155,916	3.54	1,210,284	3.53	1,304,114	3.74
Columbia,	677,085	2.16	774,755	2.28	745,826	2.28	610,562	1.81	601,729	1.73
Dauphin,	572,200	1.82	602,996	1.77	603,939	1.85	561,654	1.64	407,864	1.17
Susquehanna,	15,353	0.05	30,945	0.09	77,058	0.24	84,459	0.24	97,072	0.28
Sullivan,	77,198	0.25	84,376	0.25	86,018	0.26	75,011	0.22	61,767	0.17
Totals,	31,358,264	100.00	33,955,831	100.00	32,641,499	100.00	34,228,548	100.00	34,858,077	100.00

Various classifications have been made of the coal produced in the anthracite fields. This subject is referred to in the Annual Report for 1885, p. 300, and in a paper read before the American Institute of Mining Engineers, see Transactions, Vol. XI, pp. 136-158, on the Classification and Composition of Pennsylvania Anthracites.

The coals from the region have been classified by Mr. Joseph S. Harris in referring to the characteristics of the coals produced from the properties of the Philadelphia and Reading Coal and Iron Company.

He refers to the coals as follows :

(1) *Hard white-ash.*—"It is in great request for blast furnace and locomotive purposes, having, to an unusual degree, the qualities of resisting change of form under high heat and pressure, and, owing to its high percentage of carbon, it is valuable for producing steam ; but for domestic use on a small scale, and for open-grate fires, it does not ignite readily enough to be a favorite."

(2) *Free-burning white-ash.*—"The distinction between it and the hard-burning white-ash coal is that under such a fire as is ordinarily used for smelting metals or producing steam the impurities melt or clinker, which is not the case with the harder coal. This practical test is not, however, a very exact one. Some of the anthracites can be clinkered with a strong draught and with a thick bed of fire, and would, by a person who used them under such circumstances, be classed as free burning, while another, whose method of burning was more economical, would call them hard. Analysis shows that the free-burning white ash coals are quite as rich in fixed carbon, and that they have even higher heating power, as tested by the amount of water evaporated, than the harder variety, but their limited range of usefulness, which is due to their clinkering, prevents their price rising as high as the hard white-ash coals."

(3) *Schuylkill red-ash.*—"It is easily ignited, easy to keep burning, and where used in open grates makes less floating dust than white-ash coal, because its ash is composed of larger particles, and on account of the oxide of

iron, which constitutes its coloring matter, has greater specific gravity than the ash of the white."

(4) *Shamokin.*—"It follows in hardness and in ease of ignition next after the free burning white ash coals, and is used still more, especially for domestic purposes, its lower percentage of carbon making it ill-adapted for purposes requiring intense heat."

(5) *Lorberry red-ash.*—"It burns with a little flame, and is much in request for domestic uses in the eastern markets."

(6) *Lykens Valley red-ash.*—"It burns with considerable flame, is greatly liked in the eastern market for open grates, or other domestic uses, and for steam and heating purposes, wherever quick heat is required."

(7) *Trevorton or North Franklin white-ash.*—"The coal is pure, but its heating properties are rather low, and it is of so friable a nature that it does not stand transportation well."

(8) The Wyoming red-ash, (9) Lehigh red-ash, and (10) Loyalsock white-ash are not referred to in Mr. Harris's report. The Wyoming red-ash is similar in its general characteristics to the Schuylkill red-ash. The Lehigh red-ash is very similar to the hard white ash produced from the same region, with the exception of the color of the ash, due to the presence of iron, the same as in the softer red ash from Schuylkill, while the Bernice white ash, as a fuel, is rated by many coal men as being smilar to the Lykens Valley coal, except in the color of the ash. The geological structure and physical characteristics of the Bernice and Lykens Valley beds are, however, quite different.

The following table shows the amount of the different kinds of coal produced in the different fields, the number of producing collieries in each field from which the different varieties of coals come, and the proportion produced, both in tons and per cent. of total production:

COAL FIELD.	Character of Coal.	1884.			1885.			1886.		
		Number of collieries.	Production—tons.	Percentage of total production.	Number of collieries.	Production—tons.	Percentage of total production.	Number of collieries.	Production—tons.	Percentage of total production.
Northern,	Free-burning White-ash,	155	14,683,312	44.98	181	15,485,033	45.24	128	16,266,201	46.67
	Wyoming Red-ash,	14	1,727,965	5.30	14	1,730,033	5.05	14	1,981,674	5.69
	Total,	169	16,411,277	50.28	145	17,215,066	50.29	142	18,247,875	52.36
Eastern Middle,	Hard White-ash,	44	3,588,190	10.99	39	3,715,897	10.85	38	3,470,719	9.96
	Lehigh Red-ash,	11	1,510,494	4.63	11	1,613,710	4.72	11	1,522,642	4.37
	Total,	55	5,098,684	15.62	50	5,329,607	15.57	49	4,993,361	14.33
Western Middle,	Hard White-ash,	46	4,572,762	14.01	46	4,780,671	13.97	40	5,123,309	14.70
	Free-burning White-ash,	20	1,796,738	5.50	17	1,807,961	5.28	15	1,585,492	4.55
	Shamokin,	29	1,409,854	4.32	16	1,452,596	4.24	15	1,295,275	3.72
	Trevorton,	2	116,695	.36	1	111,709	.33	1	118,563	.34
	Total,	97	7,896,049	24.19	80	8,152,937	23.82	71	8,122,639	23.31
Southern,	Lykens Valley Red-ash,	8	1,145,008	3.50	6	1,219,070	3.56	6	1,074,917	3.08
	Hard White-ash,	15	1,045,687	3.20	12	1,289,023	3.77	14	1,563,312	4.48
	Free-burning White-ash,	38	629,473	1.93	17	619,213	1.81	11	547,041	1.57
	Schuylkill Red-ash,	14	227,467	.71	8	236,360	.69	8	157,078	0.45
	Lorberry Red-ash,	4	101,836	.31	4	92,301	.27	2	85,087	0.24
	Total,	79	3,149,471	9.65	47	3,455,927	10.10	41	3,427,435	9.82
Western Northern,	Lykens Valley White-ash,	1	86,018	0.26	1	75,011	.22	1	61,767	0.18
	Grand total,	401	32,641,499	100.00	323	34,228,548	100.00	304	34,853,077	100.00

It is found in practice that after the coal is passed through the breaker and screened into different sizes for shipment, the purity of the different sizes, as regards fixed carbon and ash, is very different. This is indicated by the following analysis of specimens collected from the Hauto screen-building of the Lehigh Coal and Navigation Company:

KIND OF COAL.	Water.	Volatile matter.	Fixed carbon.	Sulphur.	Ash.	Total.	Color of ash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	
Egg,	1.722	3.518	88.489	.609	5.662	100	Light cream.
Stove,	1.426	4.156	83.672	.572	10.174	100	Cream.
Chestnut,	1.732	4.046	80.715	.841	12.666	100	Cream.
Pea,	1.700	3.894	79.045	.697	14.664	100	Cream.
Buckwheat,	1.690	4.058	76.918	.714	16.620	100	Cream.

These coals are separated into different sizes according to the mesh of the screen over which they pass. The sizes noted in the above table passed over and through sieve meshes of the following dimensions:

	Through.	Over.
	Inches.	*Inches.*
Broken or Grate,	4	2.5
Egg,	2.5	1.75
Stove,	1.75	1.25
Chestnut,	1.25	.75
Pea,	.75	.50
Buckwheat,	.50	.25

The amount of different kinds of coal under this classification produced by the different consumers and the number of collieries producing each kind of coal for 1884, 1885 and 1886, are shown in the following table:

CHARACTER OF COAL.	1884.			1885.			1886.		
	Number of collieries.	Production—tons.	Percentage of total production.	Number of collieries.	Production—tons.	Percentage of total production.	Number of collieries.	Production—tons.	Percentage of total production.
1. Free-burning White-ash,	213	17,109,523	52.41	165	17,912,207	52.33	154	18,398,734	52.79
2. Hard White-ash,	105	9,208,639	28.20	97	9,785,591	28.59	92	10,157,340	29.14
3. Wyoming Red-ash,	14	1,727,965	5.30	14	1,730,038	5.05	14	1,981,674	5.69
4. Lehigh Red-ash,	11	1,510,494	4.63	11	1,613,710	4.72	11	1,522,643	4.37
5. Shamokin,	29	1,409,854	4.32	16	1,452,596	4.24	15	1,295,275	3.72
6. Lykens Valley Red-ash,	8	1,145,008	3.50	6	1,219,030	3.56	6	1,074,917	3.08
7. Schuylkill Red-ash,	14	227,467	.71	8	236,360	.69	8	157,078	0.45
8. Trevorton,	2	116,696	.36	1	111,709	.33	1	118,563	0.34
9. Lorberry Red-ash,	4	101,836	.31	4	92,301	.27	2	85,087	0.24
10. Bernice White-ash,	1	86,018	.26	1	75,011	.22	1	61,767	
	401	32,641,499	100.00	323	34,228,548	100.00	304	34,853,077	100.00

A comparative idea of the value of the different kinds of anthracite may be had from the following table:

Prices of Anthracite at New York city in 1882, 1883, 1884, 1885 and 1886.

GRADES.	Lump.	Grate.	Egg.	Stove.	Nut.
1882.					
Free-burning (lowest,)	$3.90	$3.90	$3,90	$4.00	$3.90
Free-burning (highest,)	4.30	4.30	4.55	4.85	4.75
Hard White-ash (lowest,)	4.85	4.25	4.25	4.25	3.90
Hard White-ash (highest,)	5.15	4.50	4.70	4.90	4.70
1883.					
Free-burning (lowest,)	3.90	3.90	4.00	4.20	4.20
Free-burning (highest,)	4.30	4.30	4.55	4.85	4.75
Hard White-ash (lowest,)	4.85	4.10	4.10	4.35	4.10
Hard White-ash (highest,)	5.15	4.50	4.70	4.90	4.70
1884.					
Free-burning (lowest,)	3.80	3.80	3.80	4.15	4.00
Free-burning (highest,)	3.80	3.80	3.80	4.40	4.15
Hard White-ash (lowest,)	4.75	4.10	4.10	4.15	4.00
Hard White-ash (highest,)	4.75	4.10	4.10	4.40	4.15
1885.					
Free-burning (lowest,)	3.30	3.00	3.00	3.50	3.10
Free-burning (highest,)	3.45	3.25	3.40	4.10	3.60
Hard White-ash (lowest,)	4.25	3.35	3.25	4.00	3.40
Hard White-ash (highest,)	4.75	3.50	3.40	4.25	3.75
1886.					
Free-burning (lowest,)	3.25	2.80	2.85	3.00	3.00
Free-burning (highest,)	3.45	3.55	3.80	4.15	3.85
Hard White-ash (lowest,)	4.25	3.35	3.35	3.65	3.00
Hard White-ash (highest,)	4.25	3.75	4.00	4.15	3.65

In the latter part of 1886 suits were entered by the Commonwealth of Pennsylvania against the various railroads and coal companies forming what was known as the trunk line pool and the coal combination for certain alleged infringements of the conditions of the charters of the companies forming these pools and violations of the State Constitution.

On the 28th of December Mr. Joseph S. Harris, president of the Lehigh Coal and Navigation Company, the oldest and one of the most important mining companies in the anthracite region, made an affadavit before the common pleas court of Dauphin county, in regard to the condition of the anthracite coal trade, the history of its development and the necessity and advantages of concerted action on the part of the mining and transportation companies.

This affidavit contains important facts of interest to the general public. On account of its special value to parties interested in anthracite mining it is quoted in this place.

Mr. Harris says:

"The production for the year 1886 was the largest ever attained in the history of the trade, and prices have been lower during this year than the average of any year since 1862, excepting the year 1879, and, in point of fact, anthracite and bituminous coals are almost the only commodities which have not shared in the general advance of prices which have taken place during the last year. An attempt was made to secure an advance of 25 cents a ton in March 1886, but it did not prove immediately successful. The incidental advantages of a large output are so great that there is always the strongest incentive to ship more coal than the market will take, and the net results of April, May and June were, with my own company, and, I believe, with the trade in general less satisfactory than for the first three months of the year. This was to some extent owing to the necessity of having contracts ahead for the sale of coal, but there was no substantial improvement in the trade until after July 1st and I believe it to be true of the whole trade, and down to that period the owners of the anthracite mines of Pennsylvania mined, transported and sold about 15,000,000 tons of that coal without getting back the cost of production and transportation, and this without any allowance for the value of coal in the ground, or interest on the capital invested.

"The mining of anthracite is attended with very large outlays of capital, especially in the Southern coal fields, in which the Lehigh Coal and Navigation Company's property is situated, where the beds of coal are of great thickness, are steeply inclined, and have been worked to great depths, so that, not counting the investment in coal lands, the money that must be spent in developing the mines alone, has for some years stood at the figure of from $2 50 to $3 00 per ton of annual capacity or from $2,400,000 to $3,000,000 for a productive capacity of 1,000,000 tons per annum. The element of expense in producing coal, which may be called "fixed cost" that is, cost which goes on whether there is any production or not, such as keeping the mines in repair, keeping the water pumped out, feeding horses and mules, paying foremen &c., is larger in mining than in almost any other business, and larger at the mines of the Lehigh Coal and Navigation Company for the reasons given, than in most other mines, having been as shown by a careful analysis, $33,150 per month in 1884, and $27,568 per month in 1885, or an average for these two years of say $30,355 per month.

"If the mines are worked to a capacity of say 50,000 tons per month, this fixed cost would be a charge of $0.607 per ton while if they are producing 120,000 tons per month, about their present capacity, the item of fixed cost would be reduced to $0.2530 per ton, making a saving in cost of $0.354 in this item alone.

"That this is not an exaggerated estimate is proved by the fact that in 1884, in the three months January to March inclusive, when the average monthly production was 42,823 tons, the average cost per ton was $2.10, while for the three months September to November inclusive, the average monthly production was 98,690 tons, and the average cost $1.38 per ton, a reduction of 72 cents per ton in cost. Again, in 1885, in the three months January to March inclusive, the average monthly production was 63,262 tons, and the average cost per ton $1.62 while in the three months August to October inclusive, the average production was 119,630 tons, and the cost $1.24 per ton, a reduction of 38 cents per ton ; and in 1886 the average production from April to June inclusive was 67,704 tons and the cost $1.82 per ton, while in the three months August to October inclusive, the average production was 106,675 tons, and the average cost $1.38 per ton, a reduction of 44 cents per ton. In each year the three consecutive months of lowest production have been compared with the three consecutive months of highest production.

From this statement two results necessarily follow; that it is to the advantage of the Lehigh Coal and Navigation Company, as well as to the advantage of its customers, that it should develop its property, so that it should be capable of a large production, and that the production should be kept up as steadily as possible. The gain by large production is so great that it is the plainest dictate of self interest to get out of the mine every ton that can be sold. Therefore this company, in common with all other companies, has gone on developing its mines until, from a monthly capacity of 67,290 tons in 1877, it reached in 1885 a monthly capacity of 118,964 tons, an increase of 77 per cent. in eight years. The growth in the demand for anthracite in the same period has risen about 51 per cent., so that it is on this account less possible now than it was eight years ago to keep the mines steadily employed.

"Careful investigation leads me to conclude that in 1883 the mines then opened had an annual productive capacity of 34,875,000 tons, and that those opened in 1884 had an annual capacity of 38,129,000 tons, while the requirement of the market in those years was 31,798,000 tons for 1883 and 30,718,000 tons for 1884, showing a surplus of capacity of 3,082,000 tons in 1883 and 7,411,000 tons in 1884, or an average for the two years of say 5,250,000 tons surplus of capacity over actual demand. This surplus capacity was not excessive, as we must be prepared at all times to meet a suddenly increased demand. The production of anthracite increased from 17,605,262 tons in 1878 to 26,142,689 tons in 1879, and when a similar increase shall again be demanded the production cannot be increased at will, nor in a short time.

"There are now, December, 1886, mines in the Hazleton region which were drowned last winter which are not yet recovered; and to open a new mine in the deeper part of the anthracite basin requires two or three years, so that no amount of capital can be relied on to increase quickly the productive capacity of the anthracite region to a great extent, and the work must be kept ahead of the demands of the market if the price is to be kept from making sudden advances. But the capacity of the mines must be kept above the average requirements, without regard to any provision for a largely increased demand, on account of the different needs of different seasons of the year. The monthly demand in the four years 1882 to 1885 inclusive, has averaged, in the three months January to March inclusive, 1,974,000 tons, and in the three months September to November inclusive, 3,110,000 tons; whence it follows that it is necessary that mines of a monthly capacity of nearly 3,000,000 tons must be kept ready for operation, though the average monthly demand for these years was only 2,564,000 tons.

"That the mining capacity is not greatly in excess of the actual requirements is shown by the fact that in no year has there failed to be a full demand in some month for all that the mines could supply, and in some months of fullest work the stocks were drawn down. Under no system that could be devised, therefore, would it be possible to have just enough mines open to supply the demand and keep the men steadily employed.

"In this respect our present practice is much better than that which obtained years ago. The miners of the Lehigh Coal and Navigation Company, until within twenty years, had to stop work from December to the following April, four months every year, during which navigation on the canals was closed, and that they are not steadily employed is a hardship which they share with every mason, bricklayer and brickmaker in the country. Competition, by lessening profits, has compelled every mine owner to do all in his power to work his mines steadily and largely, and no pressure that can be put upon the mine owner by any governmental authority can greatly increase his desire in these respects.

"The problem that presented itself to the managers of the mining companies in 1884 was this. Under the then existing methods of working the mines, whenever the supply of coal began to press heavily upon the means of storing it, all parties suspended work, usually for three days in each week, until the demand began to draw down the visible supply. This led each producer to desire to produce as much coal as possble in the days in which work was done and thus to increase the productive capacity of his mines, until, whereas in 1881, 42 days stoppage was enough to keep the shipping collieries in working condition, in 1882, 48 days were necessary, and this grew to 60 days in 1883, and 102 days in 1884 so that one-third of the time of the workmen was unemployed, and the capacity of the mines had grown to nearly 20 per cent. above the requirements of the market. Experience has shown that for some years back under all systems of working the larger producing interests have varied but little in the percentage of the total output provided by each, and it was thought that, if while allowing the market to take what coal it would, each party would provide but its usual share of the total, regulating its production as best might suit itself, coal could be produced cheaper, the incentive to constantly increase capacity would be lessened, the men could be more steadily employed, and the production and demand could more readily adjust themselves to each other. The different interests agreed to try this experiment for the year 1885; some parties shut up mines that could be profitably closed, and the productive capacity of the mines fell from 38,129,000 ton in 1884 to 36,482,400 tons in 1885, or from an excess over demand of 19.4 per cent. in 1884 to an excess of 13.3 per cent. in 1885. It was estimated in the beginning of the year that the market would require 30,000,000 tons of coal, but no attempt was made to keep the output below the demand, and it actually took 31,623,530 tons.

"After making allowance for the increase or diminution of the stock of coal at the shipping points, the amount which went into consumption for several years past has been as follows: In 1883, 31,606,813 tons; in 1884, 30,630,644 tons; in 1885, 31,743,666 tons, and in 1886, probably 32,250,000 tons, showing that during the last two years, in which restriction of output is charged, more coal was marketed than during the two preceding years, and in fact more than was ever marketed before.

"So, too, the amount of coal shipped by the Lehigh Coal and Navigation Company was in 1883, 907,126 tons; in 1884, 969,366 tons; in 1885, 1,068,840 tons, and will be in 1886, about 1,100,000 tons.

"That the output has never been restricted below the requirements of the market is shown by the fact that there has always been a large unsold supply on hand. In the ordinary workings of the anthracite trade every producer sells all the coal that he can throughout the country to what is called the 'line trade' and only sells to the stocking grounds such coals as he cannot otherwise dispose of, because the coal costs about 20 cents per ton to stock and pick up, and stock coal generally sells for less than fresh mined coal. The coal in stock at any time therefore, represents the amount for which no immediate sale can be found. In 1883, this stock varied from 502,159 tons to 748,330 tons; in 1884 it varied from 588,229 tons to 885,715 tons; while in 1885 it ranged from 420,564 tons to 988,782 tons, and in 1886 from 393,202 tons to 996,946 tons, so that this average stock unsold has not diminished in the last two years.

"The price at which coal should be marketed has never been discussed at any meeting of the representatives of the anthracite producers, nor has any action ever been taken thereon at any such meeting except at the one held March 22d. 1886. The rates of transportation have never at any time been discussed, and in fact there is no concert whatever between the transporting companies as to rates except within limited areas. The greater part of the coal is carried to market at rates which are not the subject of agreement or conference between the different companies. But it is not true, as alleged in the Commonwealth's bill, that the prices of coal and of transportation have been advanced to an unjust extent or to any extent.

"In March, 1883, the rail rate on coal from Mauch Chunk to Philadelphia was $1.80 per ton. In August 1883, this rate was advanced to $1.90 per ton. In October 1883, it was advanced to $2.00 per ton. In March 1884, it was reduced to $1.80 per ton. In July 1885 it was reduced to $1.60 per ton, and in March 1886 to $1.50 per ton, which is the present rate; so that since the beginning of 1885 the reduction has been 30 cents per ton.

"Similarly the rate on coal from the Lehigh region to New York tide via the Central Railroad of New Jersey, which in 1883 varied from $1.60 to $1.67 per ton, and in 1884 from $1.41 to $1.64 per ton, ruled in 1885, from $1.28 to $1 37 per ton, and in 1886, from $1.11 to $1.40 per ton, showing that in the last two years the rates to New York tide were considerable lower than in the previous years. To the rates here named must be added for wharfage and shipping, a sum varying in the years named from 14 cents to 20 cents, to get the free on board price, and a further sum of 15 cents to 20 cents to put the coal alongside the piers' in New York.

"As to the price realized for coal: the average price realized for the Lehigh Coal and Navigation Company's coal 'free on board' in New York harbor, has fallen each year since 1881, being, in that year, down to and including pea coal $3.95 per ton, while in 1882 the average was $3.89, in 1883 it was $3.74, in 1884 it was $3.48, in 1885 it was $3.07, while in 1886 to the end of October the latest date to which accounts are completed, it is about $2.80.

"The great fall in prices realized for coal was accompanied by a reduction in the wages of the miners of about 10 per cent but they were so much benefited by the steady work given under the present system, that the earnings per capita of the men and boys employed on the Lehigh Coal and Navigation Company's property averaged more in 1885 than in 1884, and notwithstanding all the influences that have been brought to bear on the workmen during the past year or two to make them dissatisfied, they have in the main continued steadily at work; and while they have shared with their employers lower prices, they have, as already stated, earned more per capita in the year 1885, the first of the years as to which complaint is made, than in the year 1884; and speaking from an intimate knowledge of their conditions, I assert that the community engaged in anthracite mining show from year to year that they are improving in intelligence, sobriety and material comfort.

"The reduction in cost has only been brought about by the economies which were rendered possible by concerted action. To show that the public has had at least its share of the benefits resulting from this lowering of cost, it will be sufficient to state that the profit realized on the mining of coal by the Lehigh Coal and Navigation Company in 1885, was about 28 cents per ton, which profit has fallen this year so that it will not exceed 15 cents per ton, and may not reach that amount."

CHAPTER V.

Sections in the Northern Anthracite coal field.

Section of Bennett Shaft from Surface to Bennett Bed.

Waddell & Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Sand and clay, } Crib-	50′ 0″ to 50′ 0″	50′ 0″ to 50′ 0″
2.	Sandstone, } bing.	10′ 0″ to 60′ 0″	10′ 0″ to 60′ 0″
3.	Sandstone, flat, . . .	104′ 0″ to 164′ 0″	104′ 0″ to 164′ 0 ′
4.	Hard slate, ...	20′ 0″ to 184′ 0″	20 0″ to 184′ 0″
5.	COAL, ...	7″ to 184′ 7″	7″ to 184′ 7″
6.	Hard slate, ...	43 11″ to 228′ 6″	43′ 11″ to 228′ 6″
7.	Slate bone and coal,	5′ 11″ to 234′ 5″	5′ 11 ′ to 234′ 5″
8.	Hard slate, ...	12′ 0″ to 246′ 5″	12′ 0″ to 246′ 5″
9.	Sandstone, ...	15′ 7″ to 262′ 0″	15′ 7″ to 262′ 0″
10.	COAL, ...	5″ to 262′ 5″	5″ to 262′ 5″
11.	Slate, ...	18′ 8″ to 281′ 1″	18′ 8″ to 281′ 1′
12.	COOPER BED, ...	9 6″ to 290′ 7″	9′ 6″ to 290′ 7″
13.	Slate, ...	4′ 1″ to 294′ 8″	4′ 1″ to 294′ 8″
14.	Sandstone, ...	24′ 7″ to 319′ 3″	24′ 7″ to 319′ 3″
15.	BENNETT BED, . . .	4′ 9′ to 324′ 0″	4′ 9″ to 324′ 0″

See Columnar Section Sheet No. I and Mine Sheet No. VIII. Atlas Northern Coal Field Part I.

Section of Pine Ridge shaft from surface through Lower Baltimore bed.

D. & H. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Quicksand and fire-clay, ...	44′ 0″ to 44′ 0″	44′ 0″ to 44′ 0″
2.	Sandstone and slate,	40′ 0″ to 84′ 0″	40′ 0″ to 84′ 0″
3.	COAL BED, soft, .	9′ 0″ to 93′ 0″	9′ 0″ to 93′ 0″
4.	Slate, flat, ...	42′ 0″ to 135′ 0″	42′ 0″ to 135′ 0″
5.	HILLMAN BED? . .	10′ 0″ to 145′ 0″	10′ 0″ to 145′ 0″

No. of Strata.	*Description.*		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
6.	Blue sandstone, . .		82′ 0″ to 227′ 0″	82′ 0′ to 227′ 0″
7.	Slate and fire-clay,		77′ 0″ to 304′ 0″	77′ 0″ to 304′ 0″
8.	COAL, ...		6″ to 304′ 6″	6″ to 304′ 6″
9.	Slate and fire-clay,		30′ 0″ to 334′ 6″	30′ 0″ to 334 6″
10.	COAL, ...		1′ 2″ to 335′ 8″	1′ 2′ to 335′ 8″
11.	Slate, ...		3′ 0″ to 338′ 8″	3′ 0″ to 338′ 8″
12.	Hard blue sandstone, ...		17′ 0″ to 355′ 8″	17′ 0″ to 355′ 8″
13.	Slate, ...		11′ 0″ to 366′ 8″	11′ 0″ to 366′ 8″
14.	COAL, ...	BALTIMORE BED.	11′ 0″ to 377′ 8″	11′ 0′ to 377′ 8″
15.	Slate, ...		17 0″ to 394′ 8″	17′ 0″ to 394′ 8″
16.	COAL, ...		7′ 0″ to 401′ 8″	7′ 0′ to 401′ 8″
17.	Slate, ...		14′ 0″ to 415′ 8″	14′ 0″ to 415 8″

See Columnar Section Sheet No. 1, and Mine Sheet No. VIII. Atlas Northern Anthracite Field, Part I.

Section of Rope Drill bore hole near Mill Creek Breaker, from surface through coal bed at 142′ 6″ into fire-clay.

D. & H. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of Strata,	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	6′ 6″ to 6′ 6′	6′ 6″ to 6′ 6″
2.	Slate, ...	3′ 3″ to 9′ 9″	3′ 1″ to 9′ 7″
3.	Sandstone, dip 12°S.,	18′ 9″ to 28′ 6″	18′ 3″ to 27′ 10″
4.	Slate, ...	1′ 0″ to 29′ 6′	11″ to 28′ 9″
5.	Mica sandstone, . .	23 4″ to 52′ 10″	22′ 9″ to 51′ 6″
6.	Sandstone, ...	13′ 5″ to 66′ 3″	13′ 4″ to 64′ 10″
7.	Slate, ...	6′ 8″ to 72′ 11″	6′ 7″ to 71′ 5″
8.	COAL, ...	3′ 10″ to 76′ 9″	3′ 9″ to 75′ 2″
9.	Fire-clay, ...	5′ 10″ to 82′ 7″	5′ 8″ to 80′ 10″
10.	Mica sandstone, . .	10′ 2″ to 92′ 9″	9′ 10″ to 90′ 8″
11.	Sandstone, ...	26′ 8″ to 119′ 5″	26′ 1″ to 116′ 9″
12.	Black slate, ...	2′ 1″ to 121′ 6″	2′ 0″ to 118′ 9″
13.	Sandstone, ...	10′ 1″ to 131′ 7″	9′ 10″ to 128′ 7″
14.	Blue slate, ...	1′ 11″ to 133′ 6″	1′ 10″ to 130′ 5″
15.	Sandstone, ...	6′ 0″ to 139′ 6″	5′ 10″ to 136′ 2″
16.	Slate, ...	3′ 4″ to 142′ 10″	3′ 2″ to 139′ 5″
17.	COAL, ...	3′ 2″ to 146′ 0″	3′ 1″ to 142′ 6″
18.	Fire-clay, ...	3′ 11″ to 149′ 11″	3′ 10″ to 146′ 4″

See Columnar Section Sheet No. 1, and Mine Sheet No. VIII. Atlas Northern Anthracite Field, Part I.

Section of Enterprise shaft, slope and Jump Drill bore hole from surface to Four Foot bed.

A. Langdon & Co.

(Reported by W. B. Hick, M. E.)

No. of Strata.	*Description.*			*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...		Measred in shaft.	14′ 0″ to 14′ 0″	14′ 0″ to 14′ 0″
2.	Soft shaly sandstone, ...			40′ 0″ to 54′ 0″	40′ 0″ to 54′ 0″
3.	HILLMAN OR MITCHELL BED,			7′ 11 ′ to 61′ 11″	7′ 11″ to 61′ 11″
4.	Soft sand rock, .			74′ 0″ to 135 11″	74′ 0″ to 135′ 11″
5.	Bone, . .	5 FOOT BED.		2′ 0″ to 137′ 11″	2′ 0″ to 137′ 11″
6.	COAL, . .			4 0″ to 141′ 11″	4′ 0″ to 141′ 11″
7.	Fire clay, .			5′ 0″ to 146′ 11″	5′ 0 ′ to 146′ 11″
8.	COAL, . .			1′ 2″ to 148′ 1′	1· 2″ to 148′ 1″
9.	Slate rock, . . .		Measured along rock slope.	27′ 3″ to 27′ 3″	14′ 1″ to 162′ 2″
10.	COAL, ...			4′ 7″ to 31′ 10″	2′ 10″ to 165′ 0″
11.	Coal and slate, .			10′ 10″ to 42′ 8″	5′ 8″ to 170′ 8″
12.	Hard rock, . . .			17′ 0″ to 59′ 8″	8′ 11″ to 179′ 7″
13.	COAL, ...			2′ 3″ to 61′ 11″	1′ 0″ to 180′ 7″
14.	Hard rock, . . .			62′ 0″ to 123′ 11″	32′ 1″ to 212′ 8″
15.	Dark slaty rock,			22′ 10″ to 146′ 9″	12′ 0″ to 224′ 8″
16.	Slate, ...			55′ 0″ to 201 9″	28′ 1″ to 252′ 9″
17.	COAL, ...			11′ 9′ to 213′ 6″	6″ to 253′ 3″
18.	Sand slate, . . .			111′ 0″ to 324′ 6″	5′ 6″ to 258′ 9′
19.	Hard rock, . .			12′ 0″ to 336· 6″	57 8″ to 316′ 5″
20.	Slate and Iron balls, ...			7′ 6″ to 344· 0″	6′ 2′ to 322′ 7″
21.	Fire clay, . . .			5′ 0″ to 349′ 0″	3′ 10″ to 326′ 5″
22.	COAL, rider to Baltimore, . .			29′ 0″ to 378′ 0″	2′ 6″ to 328′ 11″
23.	Hard sand slate,			27′ 0″ to 405′ 0″	14′ 10″ to 343′ 9″
24.	UPPER BALTIMORE BED, . .		Developed in workings.	8′ 3″ to 8′ 3″	8′ 3″ to 352′ 0′
25.	Fire clay, . . .			14′ 6″ to 22′ 9″	14′ 6″ to 366′ 6″
26.	LOWER BALTIMORE BED, . .			8′ 6″ to 31′ 3″	8′ 6″ to 375′ 0″
27.	Rock, ...		Measured in bore-hole.	33′ 0″ to 33′ 0″	33′ 0″ to 408′ 0″
28.	COAL, ...			1′ 8″ to 34′ 8″	1′ 8″ to 409′ 8″
29.	Rock, ...			48′ 0″ to 82′ 8′	48′ 0″ to 457′ 8″
30.	FOUR FOOT BED,			6′ 0″ to 88′ 8″	6′ 0″ to 463′ 8″

See Columnar Section Sheet No. 1, and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Henry shaft from surface to Upper Baltimore bed.

L. V. C. Co.

(Measured by Geological Survey.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Cribbing, ...	99' 7'' to 99' 7''	99' 7'' to 99' 7''
2.	Fire-clay, ...	9'' to 100' 4''	9'' to 100' 4''
3.	Hard sandstone. Dip 17° N., . . .	16' 6'' to 116' 10''	15' 8'' to 116' 0''
4.	Fire-clay, ...	8' 0'' to 124' 10''	7' 7'' to 123' 7''
5.	Slate, ...	7' 8'' to 132' 8''	7' 4'' to 130' 11''
6.	COAL, ...	4'' to 132' 10''	3'' to 131' 2''
7.	Slate, ...	3' 5'' to 136' 3''	3' 3'' to 134' 5''
8.	COAL BED. Dip 19° N., ...	8' 11'' to 145' 2''	8' 4'' to 142 9''
9.	Hard slate, ...	6' 6'' to 151 8''	6' 2'' to 148' 11
10.	COAL BED, ...	4' 8'' to 156' 4''	5' 11'' to 154 10''
11.	Bastard slate, . .	10' 8'' to 167 0''	10' 2'' to 165' 0''
12.	Sandstone, very hard. Dip 18° N.,	20' 5'' to 187' 5''	19' 5'' to 184' 5''
13.	Bastard sandstone, very hard, . . .	15' 8'' to 203' 1''	14' 11'' to 199' 4''
14.	Slate with iron ore balls, ...	10' 4'' to 213' 5''	9' 10'' to 209' 2''
15.	Sandstone, hard. Dip 21° S., ...	60' 5'' to 273' 10''	57' 5'' to 266' 7''
16.	Slate, ...	13 6'' to 287' 4''	12' 10'' to 279' 5'
17.	Sandstone and slate, ...	51' 6'' to 338' 10''	49' 0'' to 328' 5''
18.	UPPER BALTIMORE BED,*		8' 0'' to 336' 5''

See Columnar Section No. I, and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

*The actual vertical measurement of the Upper Baltimore bed is not given in the shaft, owing to the abnormal condition of the strata at that point.

Section of Henry colliery Air shaft from surface to Lower Baltimore bed.

L. V. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Earth, ...	21 0'' to 21' 0''	21' 0'' to 21' 0''
2.	Blue clay, ...	22 0'' to 43 0''	21' 4'' to 42' 4''
3.	Quicksand, . . .	11' 0'' to 54' 0''	10' 8' to 53' 0''

No. of Strata	*Description*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
4.	COAL BED, dip 14° N., ...	5' 0' to 59' 0''	4' 11'' to 57' 11''
5.	Slate, ...	12' 0' to 71' 0'	11' 8'' to 69' 7''
6.	Fire clay, ...	2' 0' to 73' 0''	1' 11'' to 71' 6'
7.	Sandstone, ...	121' 6'' to 194' 6''	117' 10'' to 189' 4''
8.	COAL, ...	6'' to 195' 0''	6'' to 189' 10'
9.	Slate, ...	4' 0'' to 199' 0''	4' 11'' to 194' 9''
10.	COAL and slate, .	1' 6'' to 200' 6''	1' 5'' to 196' 2''
11.	Sandstone, ...	47' 0'' to 247' 6''	44' 7'' to 240' 9''
12.	Slate, ...	15' 0'' to 262' 6''	14' 7'' to 255' 4''
13.	UPPER BALTIMORE BED, . . .	8' 0'' to 270' 6''	7' 9' to 263' 1''
14.	Sandstone, ...	41' 6' to 312' 0''	40' 3'' to 303' 4''
15.	LOWER BALTIMORE BED, . . .	6' 6'' to 318' 6''	6' 5'' to 309' 9''

See Columnar Section Sheet No. 1. and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Wyoming shaft, Test shaft and Jump Drill bore hole from surface to Ross bed.

J. H. Swoyer.

(Reported by J. H. Swoyer.)

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, . . .	20' 0'' to 20'	20' 0'' to 20' 0''
2.	Soft shelly sandstone, ...	14' 0'' to 34' 0''	14' 0'' to 34' 0
3.	COAL, . 5 FT. BED.	6' 0'' to 40' 0''	6' 0'' to 40' 0''
4.	Slate, . .	5' 0'' to 45' 0''	5 0'' to 45' 0''
5.	COAL, . .	1' 8'' to 46' 8''	1' 8'' to 46 8'
6.	Hard Sandstone,	211' 0'' to 257' 8''	211' 0'' to 257' 8'
7.	UPPER BALTIMORE BED,	9' 3'' to 266' 11''	9' 3'' to 266 11''
8.	Sandstone, . . .	31' 0'' to 297' 11''	31' 0'' to 297' 11''
9.	LOWER BALTIMORE BED,	7' 0'' to 304' 11'	7' 0'' to 304' 11
10.	Soft slaty rock,	29' 0' to 333' 11'	29' 0'' to 333' 11'
11.	COAL, ...	2' 0'' to 335 11''	2 0'' to 335 11''
12.	Sandstone, . . .	34' 0'' to 369' 11''	34' 0'' to 369' 11'
13.	FOUR-FOOT BED,	4 0'' to 373' 11''	4' 0' to 373' 11''
14.	Slate, ...	10' 0' to 383' 11''	10' 0'' to 383' 11'
15.	Sandstone, . .	2' 0 to 385' 11''	2' 0'' to 385' 11''
16.	Slate, ...	5' 0' to 390' 11''	5' 6'' to 390' 11'
17.	COAL, ...	1' 6' to 392' 5''	1' 6'' to 392' 5
18.	Hard sandstone,	31' 6' to 423' 11''	31' 4'' to 423' 9'
19.	COAL, ...	1 6' to 425' 5''	1' 6'' to 425' 3''

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
20.	Hard sandstone,	23' 0" to 448' 5"	22' 11" to 448' 2'
21.	Slate.	1' 0" to 449' 5"	1' 0' to 449' 2"
22.	Hard sandstone,	18 9" to 468' 2"	18' 8" to 467' 10"
23.	COAL, ...	1' 3" to 469' 5"	1' 8" to 469' 1
24.	Slate, ...	11' 0" to 480' 5"	11' 0" to 480' 1"
25.	Sandstone, . .	1' 8" to 481' 1"	1' 8" to 481 9"
26.	ROSS BED, . . .	13' 5" to 495' 6"	13' 4" to 495' 1"

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Laurel Run Rope Drill bore hole 400' north of Breaker from surface through small coal bed at 164' 9"

D. & H. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	35' 2" to 35' 2"	35' 2" to 35' 2"
2.	Slate. Dip 27° N., ...	3' 3" to 38' 5"	2' 10" to 38' 0"
3.	Sandstone, ...	2' 2" to 40' 7"	1 10" to 39' 10"
4.	Rock, ...	68' 11" to 109' 6"	61' 5" to 101 3"
5.	Slate, ...	14' 0" to 123' 6"	12 6" to 113' 9"
6.	Slate with bony COAL, . . .	2' 3" to 125' 9"	2' 0" to 115' 9"
7.	Slate, ...	1' 0" to 126' 9"	11" to 116' 8"
8.	Sandstone, light, ...	5' 0" to 131' 9"	4 5" to 121' 1"
9.	Slate and sandstone (dark),	8' 3" to 140' 0"	7' 4" to 128' 5"
10.	Slate, quite black, ...	2' 3" to 142' 3"	2' 0" to 130' 5"
11.	Slate with COAL, ...	1' 3" to 143' 6"	1' 1" to 131' 6'
12.	COAL BED, ...	8' 6" to 152' 0"	8' 5" to 139' 11"
13.	Sandstone and slate, ...	21' 6" to 173' 6"	18' 3" to 158' 2"
14.	Slate and bony COAL, . . .	2' 0" to 175' 6"	1' 9" to 159' 11"
15.	COAL BED, ...	5' 6" to 181' 0"	4' 10" to 164' 9"
16.	Fire clay, ...	1 3" to 182 3"	1' 1" to 165' 10"

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part 1.

Section of Rope Drill bore hole at Mineral Spring from surface through coal bed at 156′ 6″ into fire-clay 159′ 11″.

L. V. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	2′ 6″ to 2′ 6″	2′ 6″ to 2′ 6″
2.	Brown sandstone. Dip 12° N., ...	12′ 0″ to 14′ 6″	11′ 9″ to 14′ 3″
3.	Blue sandstone, . .	46′ 3″ to 60′ 9″	45′ 2″ to 59′ 5″
4.	Black slate, ...	3′ 0″ to 63 9″	2′ 11″ to 62′ 4″
5.	Fire-clay, ...	8″ to 64′ 5″	8″ to 63′ 0″
6.	Sandstone and slate,	2′ 6″ to 66′ 11″	2′ 5″ to 65′ 5″
7.	Fire-clay, ...	2′ 3″ to 69′ 2″	2′ 2″ to 67′ 7″
8.	Blue slate, ...	6′ 7″ to 75′ 9″	6′ 5″ to 74′ 0″
9.	Brown sandstone, .	10′ 0″ to 85′ 9″	9′ 10″ to 83′ 10″
10.	Blue sandstone, . .	18′ 0″ to 103′ 9″	17′ 7″ to 101′ 5″
11.	Slate, ...	4″ to 104′ 1″	4″ to 101′ 9″
12.	Blue sandstone, . .	2′ 6″ to 106′ 7″	2′ 5″ to 104′ 2″
13.	COAL, ...	2″ to 106′ 9″	2″ to 104′ 4″
14.	Slate, ...	6″ to 107′ 3′	6″ to 104′ 10′
15.	Blue sandstone, . .	10′ 3″ to 117′ 6″	9′ 11″ to 114′ 9″
16.	COAL BED, ...	11′ 2″ to 128′ 8″	10′ 11″ to 125′ 8″
17.	Blue Slate, ...	15′ 0″ to 143′ 8″	14′ 8″ to 140′ 4″
18.	COAL BED, ...	16′ 0″ to 149′ 8″	5′ 10″ to 146′ 2″
19.	Slate, ...	4′ 0″ to 153′ 8″	3′ 11″ to 150′ 1″
20.	COAL BED, ...	6′ 7″ to 160′ 9″	6′ 5″ to 156′ 6″
21.	Fire-clay, ...	3′ 6″ to 163′ 9″	3′ 5″ to 159′ 11″

See Columnar Section Sheet No. I and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Rope Drill bore-hole near Slope No. 1, from bottom slate of Red Ash bed, Katydid Colliery, Red Ash Coal Co.

(Reported by Red Ash Coal Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Bottom slate of RED ASH BED,	3′ 0″ to 3′ 0″	2′ 10″ to 2′ 10′
2.	A BED. Dip 20° N,	3′ 0″ to 6′ 8″	2′ 10″ to 5′ 8′
3.	Slate and sandstone, ...	12′ 0″ to 18′ 0″	11′ 3″ to 16′ 11′
4.	Conglomerate, . .	102′ 8″ to 120′ 8″	96′ 6″ to 113′ 5″
5.	Green sandstone, .	44′ 0″ to 164′ 8″	41′ 3″ to 154′ 8″

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
6.	Green and black sandstone,	12′ 11″ to 177′ 7″	12′ 2″ to 166′ 10″
	Record of hole below 12′ 2″ stratum,		
7.	Red slate,	203′ 4″ to 380′ 11″	191′ 2″ to 358′ 0″
8.	Green sandstone,	32′ 0″ to 412 11″	30′ 0″ to 388′ 0″
9.	Green sandstone and red shale,	37′ 11″ to 450′ 10″	35′ 7″ to 423 7″
10.	Green sandstone,	8′ 11″ to 459′ 9″	8′ 5″ to 432′ 0″
11.	Red shale,	109′ 7″ to 569′ 4″	103′ 1″ to 535′ 1″
12.	Green sandstone,	19′ 0″ to 588′ 4″	17′ 10″ to 552′ 11″
13.	Green sandstone and red shale,	4′ 0″ to 592′ 4″	3′ 9″ to 556′ 8″
14.	Red Shale,	108′ 6″ to 700′ 10″	102′ 1″ to 658′ 9″
15.	Hard quartz rock,	8′ 0″ to 708′ 10″	7′ 6″ to 666′ 3″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Oakwood Shaft from surface to coal bed at 659′ 10″, L. V. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Strata	158′ 0″ to 158′ 0″	143′ 2″ to 143′ 2″
2.	ABBOTT BED. Dip 26° S,	6′ 6″ to 164′ 6″	5′ 11″ to 149′ 1″
3.	Sandstone,	84′ 6″ to 249′ 0″	76′ 7″ to 225′ 8″
4.	BOWKLEY BED,	7 0″ to 256′ 0″	6′ 4″ to 232′ 0″
5.	Sandstone,	50′ 0″ to 306′ 0″	45′ 4″ to 277′ 4″
6.	HILLMAN BED,	11′ 0″ to 317′ 0″	10′ 0″ to 287′ 4″
7.	Sandstone,	98′ 0″ to 415′ 0″	88′ 10″ to 376′ 2″
8.	COAL BED,	5′ 6″ to 420′ 6″	5′ 0″ to 381′ 2″
9.	Sandstone,	175′ 6″ to 596′ 0″	159′ 0″ to 540′ 2″
10.	UPPER BALTIMORE BED,	13′ to 609′ 0″	11′ 9′ to 551′ 11″
11.	Sandstone,	18′ to 627′ 0″	16′ 4″ to 568′ 3″
12.	LOWER BALTIMORE BED,	5′ to 632′ 0″	4′ 7″ to 572′ 10″
13.	Sandstone,	90′ to 722′ 0″	81′ 7″ to 654′ 5″
14.	COAL BED,	6′ to 728′ 0″	5′ 5″ to 659′ 10″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Tunnel from surface to Red Ash bed, Katydid Colliery, Red Ash Coal Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Sandstone. Dip 6° N, ...	129′ 0″ to 129′ 0″	13′ 9′ to 13′ 9″
2.	Dirt, ...	4″ to 129′ 4″	2″ to 13′ 11″
3.	Shaly sandstone, .	99′ 2″ to 228′ 6″	8′ 10″ to 22′ 9′
4.	Slate, ...	19′ 2″ to 247′ 8″	2′ 0″ to 24′ 9″
5.	**Ross bed**, ...	88′ 6″ to 336′ 2″	9′ 3″ to 34′ 0″
6.	Sandstone. Dip 6° N, ...	50′ 6″ to 386′ 8″	5′ 6″ to 39′ 6″
7.	Slate. Dip 4° N, .	31′ 3″ to 417′ 11″	3′ 6″ to 43′ 0″
8.	**Coal**, ...	2′ 1″ to 420′ 0″	11″ to 43′ 11″
9.	Slate, ...	54′ 2″ to 474 2″	6′ 0″ to 49′ 11″
10.	**Six-foot bed**, . .	87′ 8″ to 561′ 10″	9′ 2″ to 59′ 1″
11.	Bastard slate and fire clay, ...	108′ 10″ to 670′ 8″	31′ 10″ to 90′ 11″
12.	**Red Ash bed**.* Dip 22° N, ...	. . . .	13′ 4″ to 104′ 3″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

*The Red Ash bed was measured alone here in detail, perpendicular to dip.

Section of Prospect Shaft from surface through Baltimore bed.

L. V. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	20′ 0″ to 20′ 0″	20′ 0″ to 20′ 0′
2.	Slate and soft rock,	58′ 0″ to 78′ 0″	55′ 9″ to 75 9′
3.	**Bowkley bed**. Dip 16° S., ...	7′ 3′ to 85′ 3″	7′ 0″ to 82′ 9″
4.	Sandstone, ...	81′ 0″ to 166′ 3″	77′ 9″ to 160′ 6″
5.	**Hillman bed**, .	17′ 0″ to 183′ 3″	16′ 4″ to 176′ 10″
6.	Sandstone, ...	39′ 0″ to 222′ 3″	37′ 6″ to 214′ 4″
7.	**Coal**, ...	6′ 0″ to 228′ 3″	5′ 9″ to 220′ 1″
8.	Sandstone, ...	77′ 0″ to 305′ 3″	74′ 0″ to 294′ 1″
9.	**Coal**, ...	4′ 6″ to 309′ 9″	4′ 4″ to 298′ 5″
10.	Sandstone, ...	7′ 0″ to 316′ 9″	6′ 9″ to 305′ 2″
11.	**Coal**, ...	5′ 0″ to 321′ 9″	4′ 10″ to 310′ 0″
12.	Sandstone, ...	230′ 0″ to 551′ 9″	221′ 0″ to 531′ 0″
13.	Slate, **Coal**, &c., .	4′ 0″ to 555′ 9″	3′ 10″ to 534′ 10″
14.	Sandstone, ...	2′ 0″ to 557′ 9″	1′ 11″ to 536′ 9″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
15.	**Cooper bed** (Upper Baltimore),	20′ 0″ to 577′ 9″	19′ 3″ to 556 0″
16.	Sandstone, ...	3′ 0″ to 580′ 9″	2′ 11″ to 558′ 11″
17.	**Bennett bed** (Lower Baltimore), ...	5′ 0″ to 585′ 9″	4′ 10″ to 563′ 9″
18.	Sandstone, ...	7′ 0″ to 592′ 9″	6′ 9″ to 570′ 6″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Rope Drill bore hole, between Conyngham shaft and Young's slope, from surface to Hillman bed.

D. & H. C. Co.

(Reported by D. & H. C. Co.)

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Gravel, ...	31′ 9″ to 31′ 9″	31′ 9″ to 31′ 9″
2.	Sandstone, ...	16′ to 47′ 9″	16′ 0″ to 47′ 9″
3.	**Hillman bed.**		

See Columnar Section Sheet No. I, and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Old Baltimore tunnel from surface to Baltimore bed.

D. & H. C. Co.

(Reported by D. & H. C. Co.)

No. of Strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Sandstone. Dip 34° N.,	31′ 0″ to 31′ 0″	20′ 0″ to 20′ 0″
2.	Hard pebble rock. Dip 25½° N., ...	59 0″ to 90′ 0″	29′ 6″ to 49 6″
3.	Gray sandstone, ...	15′ 0″ to 105′ 0″	6′ 3″ to 55′ 9″
4.	Fine sandstone. Dip 26½° N., ...	27′ 0″ to 132′ 0″	11′ 6″ to 67′ 3″
5.	Hard pebble rock. Dip 12½° N., ...	30′ 0″ to 162′ 0″	8′ 5″ to 75′ 8″
6.	Sandstone, Dip 18° N., .	8′ 0″ to 170′ 0″	2′ 3″ to 77′ 11″
7.	Hard pebble rock, . . .	118′ 0″ to 250′ 0″	23′ 0″ to 100′ 11″
8.	**Coal**, (First) Dip 15° N.,	11′ 0″ to 261′ 0″	4′ 7″ to 105′ 6″
9.	Fire clay, ...	12′ 0″ to 273′ 0″	3′ 0′ to 108′ 6′
10.	Gray sandstone, ...	21 0″ to 294 0″	5 3″ to 113′ 9

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
11.	Hard black slate, ...	26' 0'' to 320' 0''	7' 2'' to 120' 11''
12.	Bone, ...	2'' to 320' 2''	1'' to 121' 0''
13.	White fire clay, ...	18' 0'' to 338' 2''	3' 8' to 124' 8''
14.	Hard white pebble rock. Dip 16° N., ...	202' 0'' to 540' 2''	68' 6'' to 193' 2''
15.	Hard blue sandstone, .	64' 0'' to 604' 2''	27' 0'' to 220' 2''
16.	Hard blue slate. Dip 24° N., ...	13' 0'' to 617 2''	4' 8'' to 224' 10''
17.	Hard grey rock, ...	114 0'' to 731' 2''	46' 0'' to 270' 10''
18.	Slate, ...	4' 0'' to 735 2''	1' 5'' to 272 3''
19.	COAL, (Second), ...	11' 0'' to 746' 2''	4' 8'' to 276' 11''
20.	Dark fire clay, ...	10' 0'' to 756' 2''	3' 6'' to 280' 5'
21.	Hard black rock, ...	65' 0'' to 821' 2''	28' 2'' to 308' 7''
22.	Gray sandstone, ...	4' 0'' to 825' 2''	1' 6' to 310' 1''
23.	Hard black rock, ...	5' 0'' to 830' 2'	4' 0'' to 314' 1''
24.	Bone, ...	2'' to 830' 4''	1'' to 314' 2''
25.	Bone and fire clay. Dip 17° N., ...	38' 0'' to 868' 4''	11' 2'' to 325 4''
26.	Hard gray sandstone, .	45' 0'' to 913' 4''	10' 7'' to 335' 11''
27.	Soft sandstone, ...	18' 0'' to 931' 4''	7' 8'' to 343' 7''
28.	Hard quartz rock. Dip 34° N., ...	16 0'' to 947' 4''	5' 3'' to 348' 10''
29.	Hard gray rock, ...	81' 0'' to 1028' 4''	28' 6' to 377' 4''
30.	BALTIMORE BED. Dip 14½° N., ...		14' 5'' to 391' 9''

See Columnar Section Sheet No. I and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Baltimore (inside) tunnel from Baltimore bed to Red Ash bed.

D. & H. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	BALTIMORE BED. Dip 10° N., ...		16' 0'' to 16' 0''
2.	Fire clay and slate, .	113' 0'' to 113' 0''	19' 6'' to 35' 6'
3.	Hard sandstone, . . .	294' 0'' to 407' 0''	51' 6' to 87' 0''
4.	COAL, ...	10' 0'' to 417' 0''	1' 6'' to 88' 6''
5.	Fine conglomerate, .	96' 0'' to 513' 0''	27' 0'' to 115' 6''
6.	Slate and fire clay, .	85' 0'' to 598' 0''	22' 0'' to 137' 6''
7.	Hard sandstone, . .	164 0'' to 762' 0''	50' 6'' to 188' 0''
8.	Slate, ...	1' 0'' to 763' 0''	8'' to 188' 8''
9.	Hard sandstone, . .	232' 0'' to 995' 0''	72' 0'' to 260' 8''
10.	COAL, ...	8' 0'' to 1003' 0''	3' 0'' to 263' 8''
11.	Slate, ...	24' 0'' to 1027' 0''	7' 0'' to 270' 8'

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip,*
12.	Fine conglomerate,	58′ 2″ to 1085′ 2″	17′ 0″ to 287′ 8″
13.	Slate,	1′ 0″ to 1086′ 2″	6″ to 288′ 2″
14.	COAL,	10″ to 1087′ 0″	6″ to 288′ 8″
15.	Fine conglomerate,	77′ 0″ to 1164′ 0″	24′ 0″ to 312′ 8″
16.	COAL,	1′ 0″ to 1165′ 0″	6″ to 313′ 2″
17.	Sandstone,	198′ 0″ to 1363′ 0″	62′ 0″ to 375′ 2″
18.	RED ASH BED,		15′ 3″ to 390′ 5″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Diamond No. 1 shaft from surface to Baltimore bed.

L. & W. B. C. Co.

(Reported by L. & W. B. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Cribbing,	39′ 3″ to 39′ 3″	39′ 3″ to 39′ 3″
2.	HILLMAN BED. Dip, 15° N.,	10′ to 49′ 3″	9′ 7″ to 48′ 10″
3.	Hard sandstone,	34′ 3″ to 83′ 6″	33′ 1″ to 81′ 11″
4.	Slate,	10″ to 84′ 4″	10″ to 82′ 9″
5.	Bone,	3″ to 84′ 7″	3″ to 83′ 0″
6.	Slate,	1′ 6″ to 86′ 1″	1′ 5″ to 84′ 5″
7.	Bone,	6″ to 86′ 7″	6″ to 84′ 11″
8.	Slate,	6′ 2″ to 92′ 9″	5′ 11″ to 90′ 10″
9.	Sandstone,	12′ 2″ to 104′ 11″	11′ 9″ to 102′ 7″
10.	Slate,	8″ to 105′ 7″	8″ to 103′ 3″
11.	Sandstone.	54′ 10″ to 160′ 5″	53′ 0″ to 156′ 3″
12.	COAL BED,	4 5″ to 164′ 10″	4′ 3″ to 160′ 6″
13.	Fire clay,	2′ to 166′ 10″	1′ 11″ to 162′ 5″
14.	Sandstone,	9′ 8″ to 176′ 6″	9′ 4″ to 171′ 9″
15.	Slate,	9″ to 177′ 3″	9″ to 172′ 6″
16.	Fire clay,	9′ 2″ to 186′ 5″	8′ 10″ to 181′ 4″
17.	Hard sandstone,	68′ to 254′ 5″	65′ 8″ to 247′ 0″
18.	COAL,	1′ 3″ to 255′ 8″	1′ 2″ to 248′ 2″
19.	Hard sandstone,	53′ 9″ to 309′ 5″	51′ 11″ to 300′ 1″
20.	Slate,	5′ 3″ to 314′ 8″	5′ 1″ to 305′ 2″
21.	COAL BED,	4′ 11″ to 319′ 7″	4′ 10″ to 310′ 0″
22.	Slate,	5′ 5″ to 325′	5′ 3″ to 315′ 3″
23.	Soft sandstone,	16′ 5″ to 341′ 5″	15′ 10″ to 331′ 1″
24.	Fire clay.	15′ 4″ to 356′ 9″	14′ 10″ to 345′ 11″
25.	BALTIMORE BED,	16′ 3″ to 373′	15′ 10″ to 361′ 9″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Hollenback shaft from surface to Baltimore bed.

L. & W B. C. Co.

(Reported by L. & W. B. C. Co.)

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Cribbing, ...	30 8″ to 30′ 8″	30′ 8″ to 30′ 8″
2.	Fire-clay and soft sandstone, ...	46′ 2″ to 76′ 10″	45′ 10″ to 76′ 6″
3.	SEVEN FOOT BED. Dip 8° N., ...	7′ 0′ to 83′ 10′	6′ 11″ to 83′ 5″
4.	Slate, ...	5′ 9″ to 89′ 7″	5′ 8″ to 89′ 1″
5.	Soft sandstone, . .	77′ 0″ to 166′ 7″	76′ 2″ to 165′ 3″
6.	KIDNEY BED, . . .	8′ 9″ to 175′ 4″	8′ 8″ to 173′ 11″
7.	Slate and fire-clay, .	1 9″ to 177′ 1″	1′ 9″ to 175′ 8″
8.	Soft sandstone, . .	9 0″ to 186 1″	8′ 11″ to 184′ 7″
9.	Hard sandstone, . .	22′ 7″ to 208′ 8″	22′ 4″ to 206′ 11″
10.	Soft sandstone, . .	11′ 0″ to 219′ 8″	10′ 10″ to 217′ 9″
11.	Slate, ...	12′ 0″ to 231′ 8′	11′ 10″ to 229′ 7″
12.	Bone and slate, . .	5′ 6″ to 237′ 2″	5′ 5″ to 235′ 0″
13.	HILLMAN BED, . .	10′ 1″ to 247′ 3″	10′ 0″ to 245′ 0″
14.	Slate and fire-clay,	7′ 0″ to 254′ 3″	6′ 11″ to 251′ 11″
15.	Hard sandstone, . .	34′ 0″ to 288′ 3″	33′ 8″ to 285′ 7″
16.	Slate, ...	4′ 0″ to 292′ 3″	3′ 11″ to 289′ 6″
17.	Bone and slate, . .	2′ 0″ to 294 3″	2′ 0″ to 291′ 6″
18.	Hard sandstone, . .	31′ 0″ to 325′ 3″	30′ 8″ to 322′ 2″
19.	Conglomerate rock,	8′ 4″ to 333′ 7″	8′ 3″ to 330′ 5″
20.	Hard sandstone, . .	29′ 11″ to 363′ 6″	29′ 8″ to 360′ 1″
21.	Slate, ...	7′ 4″ to 370′ 10″	7′ 3″ to 367′ 4″
22.	COAL (rough,) . . .	4′ to 374′ 10″	3′ 11″ to 371′ 3″
23.	Slate and soft sandstone, ...	32′ 8′ to 407′ 6″	32′ 4″ to 403′ 7″
24.	Hard sandstone, . .	29′ 0″ to 436′ 6″	28′ 8″ to 432′ 3″
25.	Hard sandstone, . .	27′ 0″ to 463′ 6″	26′ 9″ to 459′ 0″
26.	Slate, ...	1′ 3″ to 464′ 9″	1′ 3″ to 460′ 3″
27.	Bone, ...	6″ to 465′ 3″	6″ to 460′ 9″
28.	Slate, ...	1′ 0″ to 466′ 3″	1′ 0″ to 461′ 9″
29.	Hard sandstone, . .	15′ 3″ to 481′ 6″	15′ 1″ to 476′ 10″
30.	Bone, ...	4″ to 481′ 10″	4″ to 477′ 2″
31.	Slate, ...	9′ 4″ to 491′ 2″	9′ 3″ to 486′ 5″
32.	Bone, ...	2′ 5″ to 493′ 7″	2′ 5″ to 488′ 10″
33.	Slate, ...	2′ 7″ to 496′ 2″	2′ 7″ to 491′ 5″
34.	Hard sandstone, . .	65′ 8″ to 561′ 10″	65′ 0″ to 556′ 5″
35.	Slate, ...	12′ 1″ to 573′ 11″	12′ 0′ to 568′ 5″
36.	BALTIMORE BED, .	18′ 0″ to 591 11″	17′ 9″ to 586′ 2″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Baltimore Rope Drill bore hole 415′ south of Baltimore outcrop, from surface to conglomerate.

D. & H. C. Co.

(Reported by D. & H. C. Co.)

No. of strata.	*Description.*		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Pipe, ...		26′ 0″ to 26′ 0″	26′ 0″ to 26′ 0″
2.	Sandstone. Dip 14½° N., ...		23′ 8″ to 49′ 8 ′	22′ 10″ to 48′ 10″
3.	Dark sandstone, soft, ...		4′ 4″ to 54′ 0″	4′ 2″ to 53′ 0″
4.	Hard sandstone, . .		15′ 0″ to 69′ 0″	14′ 6″ to 67′ 6″
5.	Sandstone, ...		14′ 0″ to 83′ 0″	13′ 6″ to 81′ 0″
6.	Hard sandstone, . .		9′ 5″ to 92′ 5″	9′ 3″ to 90′ 3″
7.	Slate, bone and COAL, ...		1′ 1″ to 93′ 6″	1′ 0″ to 91′ 3″
8.	Sandstone, ...		29′ 6″ to 123′ 0′	28′ 8″ to 119′ 11″
9.	Rough pebble rock,		5′ 4″ to 128′ 4 ′	5′ 2″ to 125′ 1″
10.	Pebble rock, . . .		18′ 8″ to 147′ 0″	18′ 1″ to 143′ 2″
11.	Slate, ...		8′ 0″ to 155′ 0″	7′ 9″ to 150′ 11″
12.	Sandstone, ...		13′ 0″ to 168′ 0″	12′ 7″ to 163′ 6″
13.	Slate, ...		2′ 0″ to 170′ 0″	1′ 11″ to 165′ 5″
14.	COAL, ...		6″ to 170′ 6″	6″ to 165′ 11″
15.	Bone, slate and COAL, ...		6″ to 171′ 0″	6″ to 166′ 5″
16.	Bone and COAL, . .		6″ to 171′ 6″	6″ to 166′ 11″
17.	Slate, ...		6′ 6″ to 178′ 0″	6′ 4″ to 173′ 3″
18.	COAL, ...		1′ 6′ to 179′ 6″	1′ 5″ to 174′ 8
19.	Slate, ...		6″ to 180′ 0″	5″ to 175′ 1″
20.	COAL, ...		6″ to 180′ 6″	6″ to 175′ 7″
21.	Slate, ...		3′ 6″ to 184′ 0″	3′ 5″ to 179′ 0″
22.	Sandstone, ...		27′ 2″ to 211′ 2″	26 4″ to 205′ 4″
23.	Slate, ...		6″ to 211′ 8″	6″ to 205′ 10′
24.	COAL, ...		6 ′ to 212′ 2″	6″ to 206′ 4′
25.	Slate, ...		14′ 10″ to 227′ 0″	14′ 4″ to 220′ 8″
26.	Hard pebble rock,		45′ 4″ to 272′ 4″	43′ 10″ to 264′ 6″
27.	COAL, ...	RED ASH BED.	9′ 0″ to 281′ 4″	8′ 8″ to 273′ 2 ′
28.	COAL & slate,		5′ 6″ to 286′ 10′	5′ 4″ to 278′ 6″
29.	Sulphur, slate and COAL, .		1′ 0″ to 287′ 10″	11″ to 279′ 5″
30.	Sandstone and COAL, .		6″ to 288′ 4″	6″ to 279′ 11″
31.	Sandstone, ...		26′ 6″ to 314′ 10″	25′ 8″ to 305′ 7″
32.	Sandstone and COAL, ...		1′ 0″ to 315′ 10″	11″ to 306′ 6″
33.	Dark sandstone, .		11′ 0″ to 326′ 10″	10′ 8″ to 317′ 2″
34.	Conglomerate, . .		9′ 3″ to 336 1″	8′ 11″ to 326′ 1″

See Columnar Section Sheet No. 1 and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Plymouth shaft No. 4, from surface to Red Ash bed.

D. & H. C. Co.

(Reported by D. & H. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface,	47′ 7″ to 47′ 7″	47′ 7″ to 47′ 7″
2.	Slate. Dip 21° 30′ S.,	9′ 11″ to 57′ 6″	9′ 2″ to 56′ 9″
3.	Gray sandstone,	25′ 1″ to 82′ 7″	23′ 3″ to 80′ 0″
4.	Slate,	9′ 5″ to 92′ 0″	8′ 11″ to 88′ 11″
5.	BENNETT BED,	14′ 0″ to 106′ 0″	13′ 0″ to 101′ 11″
6.	Dark sandstone,	11′ 7″ to 117′ 7″	10′ 9″ to 112′ 8″
7.	Gray sandstone,	2′ 2″ to 119′ 9″	1′ 11′ to 114′ 7″
8.	Fire clay,	11′ 3″ to 131′ 0″	10′ 5″ to 125′ 0″
9.	Pebble rock,	46′ 7″ to 177′ 7″	43′ 4″ to 168′ 4″
10.	Dark sandstone,	19′ 7″ to 197′ 2′	18′ 3″ to 186′ 7″
11.	Gray sandstone,	10′ 1″ to 207′ 3″	9′ 4″ to 195′ 11″
12.	Dark sandstone,	12′ 0″ to 219′ 3″	11′ 2″ to 207′ 1″
13.	Slate,	4′ 2″ to 223′ 5″	3′ 10″ to 210′ 11″
14.	COAL,	1 10″ to 225′ 3″	1′ 8″ to 212′ 7″
15.	Fire clay,	5′ 9″ to 231′ 0″	5′ 4″ to 217′ 11″
16.	Light slate,	2′ 9″ to 233′ 9″	2′ 7″ to 220′ 6″
17.	COAL,	1′ 1″ to 234′ 10″	11″ to 221′ 5″
18.	Slate,	1′ 5″ to 236′ 3″	1′ 2″ to 222′ 7″
19.	Fire clay,	1″ to 236′ 4″	1″ to 222′ 8″
20.	Dark sandstone,	10′ 5″ to 246′ 9″	9′ 8″ to 232′ 4″
21.	Light slate,	6′ 5″ to 253′ 2″	5′ 10″ to 238′ 2″
22.	Dark sandstone,	3′ 4″ to 256′ 6″	3′ 1″ to 241′ 3″
23.	Slate,	11′ 8″ to 268′ 2″	10′ 10″ to 252′ 1″
24.	C or ROSS BED,	23′ 0″ to 291′ 2′	20′ 10″ to 272′ 11″
25.	Fire clay,	5′ 4″ to 296′ 6″	4′ 11″ to 277′ 10″
26.	Dark sandstone,	17′ 6″ to 314′ 0″	16′ 3″ to 294′ 1″
27.	B or RED-ASH BED,	44′ 2″ to 358′ 2″	40′ 9″ to 334′ 10′
28.	Fire clay,	3′ 6″ to 361′ 8″	3′ 3″ to 338′ 1″

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Lance shaft No. 11 from surface to Bennett bed.

L. & W B. C. Co.

(Measured by Geological Survey).

No. of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thickness perpendicular to dip.*
1.	Slate, flat,	34′ 0″ to 34′ 0″	34′ 0″ to 34′ 0″
2.	HUTCHINSON BED,	5′ 8″ to 39′ 8″	5′ 8″ to 39′ 8″
3.	Fire clay,	10′ 10″ to 50′ 6″	10′ 10′ to 50′ 6″
4.	Fire clay and slate,	34′ 0″ to 84′ 6″	34′ 0″ to 84′ 6″
5.	Soft sandstone,	16′ 6″ to 101′ 0″	16′ 6″ to 101′ 0′

No of Strata.	*Description.*	*Thicknesses measured vertically.*	*Thickness perpendicular to dip.*
6.	Slate,	1' 3'' to 102' 3''	1' 3'' to 102' 3''
7.	COAL,	1' 5'' to 103' 8''	1' 5'' to 103' 8''
8.	Slate,	10' 7'' to 114' 3''	10' 7'' to 114' 3''
9.	Sandstone (soft),	12' 11'' to 127' 2''	12' 11'' to 127' 2''
10.	Sandstone (hard),	17' 2'' to 144' 4''	17' 2'' to 144' 4''
11.	Fire clay,	4' 2'' to 148' 6''	4' 2'' to 148' 6''
12.	Clod fire clay,	1' 6'' to 150' 0''	1' 6'' to 150' 0''
13.	LANCE BED,	6' 0'' to 156' 0''	6' 0'' to 156' 0''
14.	Fire clay,	3' 6'' to 159' 6''	3' 6'' to 159' 6''
15.	Hard sandstone,	23' 9'' to 183' 3''	23' 9'' to 183' 3'
16.	Slate,	4' 9'' to 188' 0''	4' 9'' to 188' 0''
17.	COAL,	0' 8'' to 188' 8''	0' 8'' to 188' 8''
18.	Fire clay,	12' 4'' to 201' 0''	12' 4'' to 201' 0''
19.	Sandstone,	11' 0'' to 212' 0''	11' 0'' to 212' 0''
20.	Fire clay,	20' 0' to 232' 0'	20' 0'' to 232' 0''
21.	Bone,	1' 4'' to 233' 4'	1' 4'' to 233' 4''
22.	HILLMAN BED,	8' 8'' to 242' 0''	8' 8'' to 242' 0''
23.	Fire clay,	6' 0'' to 248' 0''	6' 0'' to 248' 0''
24.	Hard sandstone,	39 0'' to 287' 0''	39' 0' to 287' 0''
25.	Slate,	6' 4'' to 293' 4''	6' 4'' to 293' 4''
26.	Bone,	1' 11'' to 295' 3''	1' 11'' to 295' 3''
27.	Fire clay,	4' 9'' to 300' 0''	4' 9'' to 300' 0''
28.	OLD BENNETT BED,	11' 4'' to 311' 4''	11' 4'' to 311' 4''
29.	Fire clay with small boulders,	24' 8'' to 336' 0''	24' 8'' to 336' 0''
30.	Hard sandstone,	28' 8'' to 364' 8''	28' 8'' to 364' 8''
31.	Soft sandstone,	1' 8'' to 366' 4'	1' 8'' to 366' 4''
32.	Hard sandstone,	8' 2'' to 374' 6''	8' 2'' to 374' 6''
33.	Hard fire clay,	1' 4'' to 375' 10''	1' 4'' to 375' 10''
34.	COAL (rough),	1' 6'' to 377' 4''	1' 6'' to 377' 4''
35.	Slate and fire clay,	19' 5'' to 396' 9''	19' 5' to 396' 9''
36.	FIVE-FOOT BED,	5' 3'' to 402' 0''	5' 3'' to 402' 0''
37.	Slate,	13' 10'' to 415' 10''	13' 10'' to 415' 10''
38.	COAL (rough),	0' 9'' to 416' 7''	0' 9'' to 416' 7''
39.	Hard sandstone,	17' 11'' to 434' 6''	17' 11'' to 434' 6''
40.	Slate and fire clay,	1' 1'' to 435' 7''	1' 1'' to 435' 7''
41.	COOPER BED,	7' 9'' to 443' 4''	7' 9'' to 443' 4''
42.	Hard fire clay,	6' 8'' to 450' 0''	6' 8'' to 450' 0''
43.	Hard sandstone,	44' 0'' to 494' 0''	44' 0'' to 494' 0''
44.	Slate, fire clay and COAL (badly mixed),	11' 0'' to 505' 0''	11' 0'' to 505' 0''
45.	BENNETT BED in roll.		

See Columnar Section Sheet No. IV, and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Gaylord (inside) tunnel from Bennett to Ross bed.

Gaylord Coal Co.

(Measured by Geological Survey.)

No. of Strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to the dip.*
1.	**BENNETT BED**, .	. . .	7' 2" to 7' 2"
2.	Slate and sandstone. Dip 12° S.,	to 94' 0"	32' 6" to 39' 8"
3.	**CHECKER BED**, .	. . .	3' 8" to 43' 4"
4.	Bastard slate, . .	to 128' 0"	13' 0" to 56' 4"
5.	Hard sandstone. Dip at 150' is 28° S., ...	128' 0" to 187' 0"	20' 9" to 77' 1"
6.	**COAL**. Dip 12° S.,	. . .	1' 8" to 78' 9"
7.	Sandstone, ...	to 211' 0"	5' 0" to 83' 9"
	(At 245' anticlinal axis, at 260', dip 6° N. at 280' synclinal.)		
8.	Hard micaceous sandstone, . . .	to 358' 0"	29' 0" to 112' 9"
9.	**COAL**. Dip 16° S.,	. . .	1' 10" to 114' 7"
10.	Sandstone, ...	to 508' 0"	30' 0" to 144' 7"
	(At 530 dip 10° S. at 555' anticlinal axis dip 10° N.)		
11.	Slate and coal. Dip 10° N., ...	to 590' 0"	. . . . . .
	(At 624' dip 24° N. at 678' synclinal dip 10° S.)		
12.	Hard sandstone, .	to 713' 0"	
13.	Slate and coal. Dip 11° S.	to 750' 0"	8' 0" to 152' 7"
	(At 825' dip 12° S.)		
14.	Hard sandstone, .	to 918' 0"	34' 6" to 187' 1"
15.	**COAL**, ...	. . .	1' 3" to 188' 4"
16.	Sandstone, ...	to 1089' 0"	31' 0" to 219' 4"
17.	Slate, ...	to 1101' 0"	3' 0" to 222' 4"
18.	**ROSS BED**, ...	. . .	8' 2" to 230' 6"

See Columnar Section Sheet No. IV, and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

NOTE.—The coal beds only were measured perpendicular to dip. Owing to irregularities of dip; No. 11 and No. 13 are identical, as are also No. 10 and No. 12, Nos. 11 and 12 being on N. dip and Nos. 10 and 13 on S. dip.

Section of Gaylord shaft from surface to Red Ash bed. Gaylord Coal Co.

(Reported by Gaylord Coal Co.)

No of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	ORCHARD BED, flat, Timbered.	31' 7" to 31 7'	31' 7" to 31' 7"
2.		8' 5" to 40' 0"	8' 5" to 40' 0"
3.		27' 0" to 67' 0"	27' 0" to 67' 0"
4.	Fire clay and slate, ...	11' 0" to 78' 0"	11' 0" to 78' 0"
5.	Soft sandstone and slate, . . .	38' 0" to 116' 0"	38' 0' to 116' 0"
6.	FIVE-FOOT BED, .	5' 0" to 121' 0"	5' 0" to 121' 0"
7.	Bastard sandslate,	8' 0" to 129' 0"	8' 0" to 129' 0"
8.	Soft sandslate, .	8' 0" to 137' 0"	8' 0" to 137' 0"
9.	Hard sandstone, .	25' 0" to 162' 0"	25' 0" to 162' 0"
10.	Slate (hard), . .	5' 0 ' to 167' 0"	5' 0" to 167' 0"
11.	Hard sandstone,.	29' 0" to 196' 0"	29' 0" to 196' 0"
12.	Hard slate, . . .	1' 0" to 197' 0"	1' 0" to 197' 0 '
13.	COAL and bone COOPER BED, .	11' 0" to 208' 0"	11' 0" to 208' 0
14.	Curly sandstone and slate, . . .	22' 0" to 230' 0"	22' 0' to 230 0 '
15.	BENNETT BED, .	8' 0" to 238' 0"	80" to 238 0
16.	Hard slate, . . .	15' 0" to 253' 0"	15' 0' to 253 0
17.	CHECKER BED, .	3' 0" to 256' 0"	3' 0" to 256' 0
18.	Sandstone and slate, ...	25' 0 ' to 281' 0"	25' 0" to 281' 0'
19.	Hard sandstone,	36' 0" to 317' 0"	36' 0" to 317 0
20.	Soft sandstone, .	13' 0" to 330' 0"	13' 0" to 330' 0
21.	Hard sandstone,.	24' 0" to 354' 0"	24' 0" to 354' 0
22.	Slate and fire clay,	11' 0" to 365' 0"	11' 0" to 365' 0 '
23.	Sandstone, . . .	42' 0" to 407' 0"	42' 0" to 407' 0
24.	Black slate, . . .	3' 0" to 410' 0"	3' 0" to 410' 0
25.	ROSS BED, . . .	8' 0" to 418' 0"	8' 0" to 418' 0 '
26.	Soft sandstone, .	9' 0" to 427' 0"	9' 0" to 427' 0
27.	Fine conglomerate, ...	75' 0" to 502' 0"	75' 0" to 502' 0
28.	Hard sandstone, .	10 0" to 512' 0"	10' 0" to 512 0 '
29.	Fine conglomerate, ...	11' 0" to 523' 0"	11' 0" to 523' 0
30.	Slate, ...	9' 0" to 532' 0"	9' 0" to 532' 0
31.	Bastard fire-clay and slate, . . .	4' 0" to 536' 0"	4' 0" to 536' 0"
32.	RED ASH BED, .	27' 0" to 563' 0"	27' 0" to 563' 0"
33.	Hard fine conglomerate, ...	12' 0" to 575' 0"	12' 0" to 575' 0"

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Dodson shaft, from surface to Baltimore bed.
Plymouth Coal Co.

(No. 1 to No. 15 reported by L. & W B. C. Co. No. 16 to No. 24 measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Cribbing, ...	9′ 2″ to 9 2″	9′ 2″ to 9′ 2′
2.	SS. Dip 5° S., . .	31′ 0″ to 40′ 2″	30′ 11″ to 40′ 1″
3.	Fire clay, ...	0′ 10″ to 41′ 0″	10″ to 40′ 11″
4.	COAL BED, . . .	5′ 10″ to 46′ 10″	5′ 10″ to 46′ 9″
5.	Sandstone, . . .	24′ 3″ to 71′ 1″	24′ 2′ to 70′ 11″
6.	Slate, ...	6″ to 71′ 7″	6″ to 71′ 5″
7.	Bone, ...	6″ to 72′ 1″	6″ to 71′ 11″
8.	Sandstone, . . .	58′ 8″ to 130′ 9″	58′ 5″ to 130′ 4″
9.	Rock, ...	16′ 8″ to 147′ 5″	16′ 7″ to 146′ 11″
10.	Fire clay, ...	3′ 7″ to 151′ 0″	3′ 7″ to 150′ 6″
11.	HILLMAN BED, .	9′ 3″ to 160′ 3″	9′ 3″ to 159′ 9″
12.	Slate, ...	1′ 8″ to 161′ 11″	1′ 8″ to 161′ 5″
13.	Sandstone, . . .	35′ 2″ to 197′ 1″	35′ 0″ to 196′ 5″
14.	Slate, ...	5′ 3″ to 202′ 4″	5′ 3″ to 201 8″
15.	OLD BENNETT BED, ...	15′ 6″ to 217′ 10″	15′ 6″ to 217′ 2″
16.	Hard sandstone, .	67′ 0″ to 284′ 10″	64′ 8″ to 281′ 10′
17.	COAL, ...	1′ 5″ to 286′ 3″	1′ 4″ to 283′ 2″
18.	Sandy slate, . . .	20′ 7″ to 306′ 10″	19′ 11″ to 303′ 1″
19.	FIVE-FOOT BED, .	5′ 0″ to 311′ 10″	4′ 10″ to 307′ 11″
20.	Slate, ...	7′ 0″ to 318′ 10″	6′ 9″ to 314′ 8″
21.	Sandstone, . . .	39′ 4″ to 358′ 2″	38′ 0″ to 352 8″
22.	Slate, ...	10 4″ to 368′ 6″	9′ 11″ to 362′ 7″
23.	Slaty sandstone,.	19′ 11″ to 388′ 5″	9′ 3″ to 381′ 10″
24.	BALTIMORE BED,	14′ 6″ to 402′ 11″	14′ 0″ to 395′ 10″

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Avondale shaft, from surface to Red Ash bed.

D. L. & W. R. R. Co.

(Reported by D. L. & W. R. R. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	SS. Dip. 5° S., . .	80′ 0″ to 80′ 0″	79′ 8″ to 79′ 8″
2.	ROSS BED, ...	5′ 0″ to 85′ 0″	5′ 0′ to 84′ 8″
3.	Sandstone, ...	90′ 0″ to 175′ 0″	89′ 8″ to 174 4″
4.	COAL, ...	2′ 0″ to 177′ 0″	2′ 0″ to 176′ 4″
5.	Sandstone, ...	60′ 0″ to 237′ 0″	59′ 9″ to 236′ 1″
6.	RED ASH BED, . . .	22′ 0″ to 259′ 0″	21′ 11″ to 258′ 0″

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Avondale tunnel and Rock slope, from surface to Red Ash bed.

D. L. & W. R. R. Co.

(Measured by Geological Survey.)

No. of strata.	Description.		Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	Slaty SS. Dip. 8° S.,		50′ 0″ to 50′ 0″	7′ 5″ to 7′ 5″
2.	Hard sandstone,		79′ 0″ to 129′ 0″	11′ 7″ to 19′ 0″
3.	Slaty sandstone,		101′ 0″ to 230′ 0″	18′ 4″ to 37′ 4″
4.	Slate,		14′ 4″ to 244′ 4″	2′ 0″ to 39 4″
5.	ROSS BED. Flat to 293′ 6″, then dip 9° S.,		49′ 2″ to 293′ 6″	3′ 5″ to 42′ 9″
6.	Sandstone,		63′ 6′ to 357′ 0″	9 5′ to 52′ 2′
7.	COAL,		6″ to 357′ 6″	6″ to 52′ 8″
8.	Sandstone,	In tunnel to head of slope.	662′ 2″ to 1019′ 8′	165′ 2″ to 217′ 10″
		In slope dipping 18° N.,	143′ 0″	
9.	*RED ASH BED,			20′ 0″ to 237′ 10″

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

*Red Ash bed was measured perpendicular to depth only.

Section of Nottingham shaft No. 15, from surface to Red Ash bed.

L. & W B. C. Co.

(Reported by D. L. & W. R. R. Co.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Cribbing,	66′ 10″ to 66′ 10″	66′ 10″ to 66′ 10″
2.	Gray SS. Dip 7° S.,	45′ 0″ to 111′ 10″	44′ 8′ to 111′ 6″
3.	Slate,	5′ 3″ to 117′ 1″	5′ 3″ to 116′ 9″
4.	Sandstone,	43′ 0″ to 160′ 1″	42′ 8″ to 159′ 5″
5.	Slate,	3′ 8″ to 163′ 9″	3′ 8″ to 163′ 1″
6.	COAL,	8″ to 164′ 5″	8″ to 163′ 9″
7.	Slate,	11′ 10″ to 176′ 3″	11′ 9″ to 175′ 6″
8.	Sandstone,	31′ 6″ to 207′ 9″	31′ 3″ to 206′ 9″
9.	Slate,	18′ 0″ to 225′ 9″	17′ 10″ to 224′ 7″
10.	ROSS BED,	9′ 4″ to 235′ 1″	9′ 4″ to 233′ 11″
11.	Hard sandstone,	103′ 0″ to 338′ 1″	102′ 3″ to 336′ 2″
12.	Slate,	11′ 7″ to 349′ 8″	11′ 6″ to 347′ 8″
13.	RED ASH BED,	18′ 9″ to 368′ 5″	18′ 8″ to 366′ 4″

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Plymouth Diamond Drill bore-hole, from surface through coal bed at 368' 7".

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

*No. of strata.	*Description.*	*Thicknesses measured vertically.*		*Thicknesses perpendicular to dip.*	
1.	Wash, ...	80' 6"	to 80' 6"	77' 9"	to 77' 9"
2.	COAL, slate and SS.,	1' 6"	to 82' 0"	1' 6"	to 79' 5"
3.	COAL. Dip 15° S.,	1' 0"	to 83' 0"	1' 0"	to 80' 3"
4.	Slate, ...	7'	to 90' 0"	6' 9"	to 87' 0"
5.	Sandstone, ...	14' 3"	to 104' 3"	13' 9"	to 100' 9"
6.	Slate, ...	4' 3"	to 108' 6"	4' 1"	to 104' 10"
7.	COAL BED, ...	5' 7"	to 114' 1"	5' 4"	to 110' 2"
8.	Slate, ...	3' 7"	to 117' 8"	3' 5"	to 113' 7"
9.	Fine sandstone, .	6' 2¾"	to 123' 10¾"	6' 0"	to 119' 7"
10.	Fine sandstone, .	7½"	to 124' 6¼"	7½"	to 120' 2½"
11.	Sandstone, ...	32' 7¾"	to 157' 2"	31' 6"	to 151' 8½'
12.	COAL and slate, .	5"	to 157' 7"	5"	to 152' 1½"
13.	Sandstone, ...	10' 11"	to 168' 6"	10' 6"	to 162' 7½"
14.	Slate, ...	2' 6"	to 171' 0"	2' 5"	to 165' 0½"
15.	COAL BED, ...	13' 6¾"	to 184' 6¾"	13' 2"	to 178' 2½"
16.	Slate, ...	7"	to 185' 1¾"	7"	to 178' 9½"
17.	COAL BED, ...	2' 8"	to 187' 9¾"	2' 7"	to 181' 4½"
18.	Gray rock, ...	32' 7¼"	to 220' 5"	31' 7"	to 212' 11½"
19.	COAL BED, ...	2' 0"	to 222' 5"	1' 11"	to 214' 10½"
20.	Slate, ...	8' 5"	to 230' 10"	8' 3"	to 223' 1½"
21.	Sandstone, ...	7' 2½"	to 238' 0½"	7' 0"	to 230' 1½"
22.	Gray rock, ...	17' 1"	to 255' 1½"	16' 6"	to 246' 7½"
23.	Sandstone, ...	1' 6½"	to 256' 8"	1' 5"	to 248' 0½"
24.	Gray rock, ...	1' 0"	to 257' 8"	1' 0"	to 249' 0½"
25.	COAL BED, ...	6"	to 258' 2"	6"	to 249' 6½"
26.	Sandstone, ...	11' 0"	to 269' 2"	10' 7"	to 260' 1½"
27.	Gray rock, ...	27' 9"	to 296' 11"	26' 10"	to 286' 11½"
28.	Slate, ...	13' 5"	to 310' 4"	13' 0"	to 299' 11½"
29.	Sandstone, ...	1' 8"	to 312' 0'	1' 7"	to 301' 6½"
30.	Sandstone, ...	14 6"	to 326' 6"	14' 0"	to 315' 6½"
31.	Gray rock, ...	4' 0	to 330' 6"	3' 10"	to 319' 4½"
32.	COAL BED, ...	3½"	to 330' 9½"	3½"	to 319' 8"
33.	Slate, ...	2 2½'	to 333' 0"	2' 1"	to 321' 9"
34.	Dark sandstone, .	9 0	to 342' 0'	8' 8"	to 330' 5"
35.	Gray rock, ...	1' 6	to 343 6"	1' 5"	to 331' 10"
36.	Dark sandstone, .	7 11	to 351 5"	7' 7"	to 339' 5"
37.	Slate, . . .	2 11	to 354 4	2' 10"	to 342' 3"
38.	COAL BED, .	2 8	to 357 0'	2' 7"	to 344' 10"
39.	Slate, . .	2 10	to 359 10	2' 8"	to 347' 6"
40.	Sandstone, .	9 8	to 369 6	9' 4'	to 356' 10"
41.	Gray rock, . .	10	to 370 4	10	to 357' 8"

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
42.	Slate, ...	9′ 2″ to 379′ 6″	8′ 10″ to 366′ 6″
43.	COAL BED, ...	2′ 1″ to 381′ 7″	2′ 1″ to 368′ 7″
44.	Slate, ...	5″ to 382′ 0″	5″ to 369′ 0″

See Columnar Section Sheet No. IV and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Wanamie No. 18 tunnel, from Baltimore bed to Red Ash bed.

L. & W B. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	BALTIMORE BED, .	. . . .	6′ 2″ to 6′ 2″
2.	Slate and bone, . .	. . . .	1′ 4′ to 7′ 6″
3.	Slate, ...	. . . .	9″ to 8′ 3″
4.	Slate and bone, . .	. . . .	1′ 2″ to 9′ 5″
5.	Slate, ...	. . . .	2′ 2″ to 11′ 7″
6.	COAL BED, ...	. . . .	1′ 5″ to 13′ 0″
7.	Soft sandstone, . .	30′ 5″ to 30′ 5″	9′ 6′ to 22′ 6″
8.	Black slate, ...	14′ 0″ to 44′ 5″	4′ 6″ to 27′ 0″
9.	Soft sandstone, . .	89′ 0″ to 133′ 5″	27′ 9′ to 54′ 9″
10.	Sandy slate, . . .	52 8′ to 186′ 1″	16′ 3″ to 71′ 0″
11.	Fire clay, ...	3′ 11″ to 190′ 0″	1′ 6″ to 72′ 6″
12.	COAL. Dip. 18° N.,	7′ 5″ to 197′ 5″	1′ 9″ to 74′ 3″
13.	Sandy slate, ...	30′ 6″ to 227′ 11″	9′ 6″ to 83′ 9″
14.	Slaty sandstone, .	50′ 0″ to 277′ 11″	14′ 9″ to 98′ 6″
15.	UPPER ROSS BED. Dip 18° N.	21′ 3″ to 299′ 2″	7′ 10″ to 106′ 4″
16.	Hard sandy slate, at 350′ dip is 19° N.	249′ 7″ to 548′ 9″	81′ 6″ to 187′ 10″
17.	COAL. Dip 20° N.,	11′ 2″ to 559′ 11″	2′ 8″ to 190′ 6′
18.	Slate, ...	16′ 6″ to 576′ 5″	5′ 6″ to 196′ 0″
19.	BOTTOM ROSS BED. Dip. 19° N. . . .	13′ 0″ to 589′ 5″	5′ 0″ to 201′ 0″
20.	Sandstone, ...	107′ 0″ to 696′ 5″	37′ 9″ to 238′ 9″
21.	RED ASH BED. Dip 22° N., ...		8′ 0″ to 246′ 9″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Northern Anthracite Field, Part I.

Nos. 1, 2, 3, 4, 5, 6 and 21 were measured perpendicular to the dip only. The continued section therefore begins at No. 6 and ends at No. 20.

Section of Tunnel, from surface to D bed, Alden colliery.

Alden Coal Company.

(Measured by Geological Survey.)

*No. of strata.	*Description.*	*Thicknesses measured horizontally.*			*Thicknesses perpendicular to dip.*		
1.	SS. Dip 20° N., . .	78' 5''	to	78' 5''	26' 8''	to	26' 8''
2.	Slate, ...	2' 9''	to	81' 2''	8''	to	27' 4''
3.	Coal and slate. Dip 14° N., ...	12' 10''	to	94' 0''	2' 7''	to	29' 11''
4.	Slate, ...	16' 00''	to	110' 0''	7' 10''	to	37' 9''
5.	Sandstone, ...	22' 6''	to	132' 6''	6' 11''	to	44' 8''
6.	Slate, ...	10' 0''	to	142' 6''	2' 2''	to	46' 10''
7.	Sandstone, ...	40' 6''	to	183' 0''	9' 10''	to	56' 8''
8.	Slate. Dip 14° N.,	1' 0''	to	184' 0''	6''	to	57' 2''
9.	Sandstone, ...	14' 0''	to	198 0''	3' 3''	to	60' 5''
10.	Slate, ...	4' 0''	to	202' 0''	1' 0''	to	61' 5''
11.	Slate and SS., . .	24' 4''	to	226' 4''	4' 10''	to	66' 3''
12.	Coal. Dip 14° N.,	1' 0''	to	227' 4''	6''	to	66' 9''
13.	Slate, ...	7' 1''	to	234' 5''	1' 8''	to	68' 5''
14.	Sandstone, ...	59' 4''	to	293' 9''	15' 0''	to	83' 5''
15.	Slate, ...	3' 11''	to	297' 8''	1' 3''	to	84' 8''
16.	Sandstone, ...	61' 4''	to	359' 0''	15' 0''	to	99' 8''
17.	Slate. Dip 12° N.,.	19' 6''	to	378' 6''	4' 2''	to	103' 10''
18.	Bennett or E Bed, ...	19' 2''	to	397' 8''	4' 6''	to	108' 4''
19.	Slate, ...	16' 4''	to	414' 0''	4' 0''	to	112' 4''
20.	Sandstone, ...	36' 0''	to	450' 0''	7' 6''	to	119' 10''
21.	Slate, ...	1' 0''	to	451' 0''	1' 0''	to	120' 10''
22.	Sandstone, ...	29' 3''	to	480' 3''	5' 6''	to	126' 4''
23.	Coal, ...	2' 0''	to	482' 3''	1' 5''	to	127' 9''
24.	Slate, ...	12' 9''	to	495' 0''	2' 6''	to	130' 3''
25.	SS. Dip 12° N., . .	289' 0''	to	784' 0''	59' 6''	to	189' 9''
26	Slate, ...	6''	to	784, 6''	9''	to	190' 6''
27.	Twin or D Bed,.	54' 11''	to	839' 5''	6' 8''	to	197' 2''

See Columnar Section Sheet No. IV and Mine Sheet No. III.

Section of Alden shaft, Alden, Pa.

Alden Coal Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*		*Thicknesses measured vertically.*			*Thicknesses perpendicular to dip*		
1.	Clay, ...	CRIBBING.	8' 7''	to	8' 7''	8' 7''	to	8' 7''
2.	Quicksand, .		39' 11''	to	48' 6''	39' 11''	to	48' 6''
3.	Hard pan, . .		20' 0''	to	68' 6''	20' 0''	to	68' 6''
4.	SS. Dip 18° N.,		6' 11''	to	75' 5''	6' 7''	to	75' 1''

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
5.	Hard sandstone, .	37′ 2″ to 112′ 7″	35′ 4″ to 110′ 5″
6.	COAL, ...	9″ to 113′ 4″	9″ to 111′ 2″
7.	Slate, ...	1′ 3″ to 114′ 7″	1′ 2″ to 112′ 4″
8.	Hard sandstone, .	21′ 10″ to 136′ 5″	20′ 9″ to 133′ 1″
9.	Slate, ...	10′ 3″ to 146′ 8″	9′ 9″ to 142′ 10′
10.	Sandstone, ...	2′ 5″ to 149′ 1″	2′ 3″ to 145′ 1″
11.	COAL, ...	9″ to 149′ 10″	9″ to 145′ 10″
12.	Hard slate with fire balls, ...	30′ 7″ to 180′ 5″	29′ 2″ to 175′ 0″
13.	BENNETT BED, .	5′ 1″ to 185′ 6″	4′ 10″ to 179′ 10″
14.	Slaty sandstone, .	23′ 9″ to 209′ 3″	22′ 6″ to 202′ 4″
15.	Hard sandstone, .	41′ 10″ to 251′ 1″	39′ 9″ to 242′ 1″
16.	Slate, ...	4′ 0″ to 255′ 1″	3′ 10″ to 245′ 11″
17.	TWIN BED, ...	9′ 4″ to 264′ 5″	7′ 1″ to 253′ 0″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Northern Anthracite Field, Part I.

Section of Tunnel and Rock slope, from surface to Red Ash bed, Chauncey Colliery.

T. P. Macfarlane.

(Measured by Geological Survey.)

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Sandstone. Dip 12° S., .		23′ 4″ to 23′ 4″	5′ 0″ to 5′ 0″
2.	ROSS BED, ...		19′ 0″ to 42′ 4″	4′ 0″ to 9′ 0″
3.	Sandstone, ...		69′ 8″ to 112′ 0″	15′ 6″ to 24′ 6″
4.	COAL, ...		7′ 0″ to 119′ 0″	1′ 6″ to 26′ 0″
5.	Sandstone,	In tunnel, In slope N. dip 18°, .	333′ 6″ to 452′ 6″ 264′ 0″	180′ 0″ to 206′ 0″
6.	COAL, ...	RED ASH BED.*		15′ 10″ to 221′ 10″
7.	Sandstone, ...			4′ 0″ to 225′ 10″
8.	COAL, ...			8′ 2″ to 234′ 0″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Northern Anthracite Field, Part I.

* Measured perpendicular to dip only.

Section of Espy or Hanover tunnel No. 17, No. 17 colliery.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No, of strata.	*Description.*	*Thicknesses measured vertically.*			*Thicknesses perpendicular to the dip.*		
1.	**Coal Bed.** Dip 59° north, ...	9' 0''	to	9' 0''	8' 0''	to	8' 0''
2.	Strata, ...	231' 6''	to	240' 6''	176' 0''	to	184' 0''
3.	**Coal Bed.** Dip 39½°,	21 0''	to	261 6''	13' 6''	to	197' 6'·
4.	Strata, ...	199' 6''	to	461' 0''	128' 0''	to	325' 6'
5.	**Coal Bed.** Dip 43°	10' 0''	to	471' 0''	7' 0''	to	332' 6''
6.	Strata, ...	225' 0''	to	696' 0''	163' 0''	to	495' 6''
7.	**Coal Bed.** Dip 51°	10' 0''	to	706 0''	7' 0''	to	502' 6''
8.	Strata, ...	183' 0 '	to	889' 0''	142' 0''	to	644' 6''
9.	**Coal Bed.** Dip 45°	3' 6''	to	892' 6'·	2' 6''	to	647' 0''
10.	Strata, ...	100' 0''	to	992' 6''	71' 0''	to	718' 0''
11.	**Coal Bed.** Dip 44°	5' 0''	to	997' 6''	3' 6''	to	721' 6''
12.	Strata, ...	36' 0''	to	1033' 6''	27' 0''	to	748' 6''
13.	**Coal Bed.** Dip 50°	12' 0''	to	1045' 6''	10' 0''	to	758' 6''
14.	Strata, ...	111' 0''	to	1156' 6''	81' 0''	to	839' 6''
15.	**Coal Bed.** Dip 43°	2' 0''	to	1158' 6''	1' 6''	to	841' 0''
16.	Strata, ...	105' 0''	to	1263' 6''	72' 0''	to	913' 0''
17.	**Coal Bed.** Dip 44°	6' 6''	to	1270' 0''	5' 0''	to	918' 0''
18.	Strata, ...	47' 0''	to	1317' 0''	32' 0''	to	950' 0''
19.	**Coal Bed.** Dip 35°	1' 6''	to	1318' 6''	1' 0''	to	951' 0''
20.	Strata, ...	145' 0''	to	1463' 6''	93' 0''	to	1044' 0''
21.	**Coal Bed,**	7' 0''	to	1470' 6''	4' 3''	to	1048' 3''
22.	Strata, ...	98' 0''	to	1568' 6''	56' 0''	to	1104' 3''
23.	**Coal Bed,**	6' 0''	to	1574' 6''	3' 4''	to	1107' 7''
24.	Strata, ...	100' 0''	to	1674'' 6'	58' 0''	to	1165' 7''
25.	**Coal Bed.** Dip 35°	3' 6''	to	1678' 0''	2' 0''	to	1167' 7''
26.	Strata, ...	58' 0''	to	1736' 0''	35' 0''	to	1202' 7''

See Columnar Section Sheet No. IV and Mine Sheet No. VI, Atlas Northern Coal Field, Part I.

Section of Upper Lift tunnel from E bed to B bed, Warrior Run colliery.

A. J. Davis.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally*	*Thicknesses perpendicular to dip.*
1.	E BED. Dip 25° N. .	. . . .	19′ 2″ to 19′ 2″
2.	Slate and fire clay. Dip N. 27°, ...	16′ 0″ to 16′ 0′	7′ 0″ to 26′ 2″
3.	Hard sandstone, . .	44′ 6″ to 60′ 6″	19′ 0″ to 45′ 2′
4.	Slate, ...	48′ 0″ to 108′ 6″	22′ 0″ to 67′ 2″
5.	D BED, ...	22′ 6″ to 131′ 0″	7′ 1″ to 74′ 3″
6.	Slate, ...	4′ 4″ to 135′ 4″	5′ 6″ to 79′ 9″
7.	Fire clay, ...	8′ 4″ to 143′ 8″	4′ 9″ to 84′ 6″
8.	Sandstone, ...	110′ 4″ to 254′ 0″	50′ 0″ to 134′ 6″
9.	Fine conglomerate .	35′ 6″ to 289′ 6″	17′ 0′ to 151′ 6′
10.	C BED. Dip 30° N., .	10′ 6″ to 300′ 0″	9′ 10″ to 161′ 4′
11.	Micaceous sandstone,	75′ 4″ to 375′ 4″	36′ 0″ to 197′ 4″
12.	Fine conglomerate, .	11′ 8″ to 387′ 0″	6′ 0″ to 203′ 4″
13.	B BED. Dip 32° N. .	. . . .	10′ 2″ to 213′ 6″

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Northern Coal Field, Part I.

NOTE.—Nos. 1 and 13 were measured perpendicular to dip only. The continued section, in the third column, therefore begins with No. 2 and ends with No. 12.

Section of Lower Lift tunnels, Warrior Run colliery, from C to E bed.

A. J. Davis.

(Measured by Geological Survey.)

	No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
Tunnel from D to E Bed.	1.	E BED, ...	. . . .	19′ 2″ to 19′ 2″
	2.	Slate and fire clay, .	8′ 0″ to 8′ 0″	4′ 0″ to 23′ 2″
	3.	SS. Dip 32° N, . .	51′ 6″ to 59′ 6″	27′ 0″ to 50′ 2″
	4.	Slate, ...	1′ 0″ to 60′ 6″	1′ 0″ to 51′ 2″
	5.	Sandstone, ...	27′ 6″ to 88′ 0″	15′ 0″ to 66′ 2″
	6.	Slate, ...	30′ 0″ to 118′ 0″	11′ 0″ to 77′ 2″
Tunnel from C to D Bed.	7.	D BED, ...	. . . .	7′ 1″ to 84′ 3″
	8.	Slate. Dip 23° N., .	4′ 4″ to 4′ 4″	2′ 0′ to 86′ 3″
	9.	Fire clay, ...	9′ 4″ to 13′ 8″	3′ 9″ to 90′ 0″
	10.	Mica sandstone, . .	103′ 0″ to 116′ 8″	43′ 0″ to 133′ 0″
	11.	Fine conglomerate	61′ 6″ to 178′ 2″	26′ 0″ to 159′ 0″
	12.	C BED, ...	. . . .	10′ 10″ to 169′ 10″

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Northern Anthracite Field, Part I.

The tunnel in which the upper part of this section (Strata No. 1 to 7 inclusive) was measured is several hundred feet west of the tunnel in which the lower part (Strata Nos. 7 to 12 inclusive) was measured. Strata No. 7 is cut in both tunnels.

Section of Maltby tunnel, from Four-foot bed through Coal seam at 328′ 5″ into sandstone at 338′ 5″.

L. V. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	FOUR-FOOT BED. Dip 53° S.,	21′ 6″ to 21′ 6″	4′ 6″ to 4′ 6″
2.	Slate,	4′ 6″ to 26′ 0″	2′ 6″ to 7′ 0″
3.	Sandstone,	20′ 6″ to 46′ 6″	19′ 0″ to 26′ 0″
4.	Sandstone. Dip 60° S.	22′ 6″ to 69′ 0″	18′ 0″ to 44′ 0″
5.	Slate,	44′ 7″ to 113′ 7″	32′ 7 ′ to 76′ 7″
6.	Slate,	10′ 3″ to 123′ 10″	7′ 6″ to 84′ 1″
7.	SIX-FOOT BED,	8′ 2″ to 132′ 0″	6′ 0″ to 90′ 1″
8.	Slate,	4′ 6 ′ to 136′ 6″	3 6″ to 93′ 7″
9.	Sandstone,	82′ 0″ to 218′ 6″	53′ 0″ to 146′ 7″
10.	Slate,	11′ 0″ to 229′ 6″	7′ 6″ to 154′ 1″
11.	COOPER OR ELEVEN-FOOT BED,	17′ 0 ′ to 246′ 6″	9′ 6″ to 163′ 7″
12.	Hard slate. Dip 40° S.,	15′ 0″ to 261′ 6″	8′ 6″ to 172′ 1″
13.	Sandstone,	39′ 0″ to 300′ 6″	20′ 0″ to 192′ 1″
14.	BENNETT OR NINE-FOOT BED,	17′ 0″ to 317′ 6″	6′ 0″ to 198′ 1″
15.	Slate,	9′ 0″ to 326′ 6″	4′ 6″ to 202′ 7″
16.	Sandstone,	73′ 0″ to 399′ 6″	36′ 6″ to 239′ 1″
17.	Slate,	1′ 0″ to 400′ 6″	7′ to 239′ 8″
18.	COAL,	5′ 0″ to 405′ 6″	2′ 0″ to 241′ 8″
19.	Slate,	2′ 0″ to 407′ 6″	1′ 2″ to 242′ 10″
20.	Sandstone,	17′ 0″ to 424′ 6″	8′ 3″ to 251′ 1″
21.	Slaty sandstone,	7′ 0″ to 431′ 6″	3 6″ to 254′ 7″
22.	Sandstone. Dip 30° S.,	61′ 6″ to 493′ 0″	30′ 0″ to 284′ 7″
23.	Slate,	4′ 6″ to 497′ 6″	3′ 0″ to 287′ 7″
24.	ROSS BED,	13′ 0″ to 510′ 6″	6′ 7″ to 294′ 2″
25.	Slate,	4′ 6″ to 515′ 0″	2′ 7 ′ to 296′ 9″
26.	Sandstone,	56′ 6″ to 571′ 6″	27′ 8″ to 324′ 5″
27.	Slate,	5′ 6″ to 577′ 0″	3′ 0″ to 327′ 5″
28.	COAL and slate,	1′ 6″ to 578′ 6″	1′ 0″ to 328′ 5″
29.	Sandstone,	20′ 0″ to 598′ 6″	10′ 0″ to 338′ 5″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Maltby shaft No. 2, from surface to Eleven-foot bed.

L. V. C. Co.

(Reported by I. A. Stearns, M. E.)

No. of strata.	*Description.*	*Thickness measured vertically.*	*Thickness perpendicular to the dip.*
1.	Surface and broken rock, ...	34′ 9″ to 34′ 9″	34′ 9″ to 34′ 9″
2.	Sandstone, ...	28′ 0″ to 62′ 9″	27′ 7″ to 62′ 4″
3.	Slate, ...	6′ 4″ to 69′ 1″	6′ 3″ to 68′ 7″
4.	Bony coal, ...	2′ 2″ to 71′ 3″	2′ 2″ to 70′ 9″
5.	Slate, ...	10′ 4″ to 81′ 7″	10′ 2″ to 80′ 11″
6.	Four-foot bed, . .	5′ 7″ to 87′ 2″	5′ 7″ to 86′ 6″
7.	Slate, ...	3′ 0″ to 90′ 2″	2′ 11″ to 89′ 5″
8.	Sandstone, ...	66′ 3″ to 156′ 5″	65′ 3″ to 154′ 8″
9.	Slate, ...	3′ 6″ to 159′ 11″	3′ 5″ to 158′ 1″
10.	Six-foot bed, . . .	6′ 0″ to 165′ 11″	5′ 11″ to 164′ 0″
11.	Fire clay, ...	2′ 0″ to 167′ 11″	2′ 0″ to 166′ 0″
12.	Sandstone, ...	59′ 0″ to 226′ 11″	58′ 9″ to 224′ 9″
13.	Coal, ...	1′ 0″ to 227′ 11″	1′ 0″ to 225′ 9″
14.	Fire clay, ...	16′ 0″ to 243′ 11″	16′ 0″ to 241′ 9″
15.	Sandstone, ...	9′ 0″ to 252′ 11″	9′ 0″ to 250′ 9″
16.	Coal, ...	3″ to 253′ 2″	3″ to 251′ 0″
17.	Slate, ...	5′ 9″ to 258′ 11″	5′ 9″ to 256 9″
18.	Coal, ...	5″ to 259 4″	5″ to 257′ 2″
19.	Slate, ...	17′ 0″ to 276′ 4″	17′ 0″ to 274′ 2″
20.	Eleven-foot bed. .	10′ 0″ to 286′ 4″	9′ 11″ to 284′ 1″

See Columnar Section No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Maltby shaft No. 1, from surface to Nine-foot or Bennett bed.

L. V. C. Co.

(Reported by J. H. Swoyer.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Surface, ...	10′ 0″ to 10′ 0″	10′ 0″ to 10′ 0″
2.	Sandstone, ...	28′ 0″ to 38′ 0″	27′ 7″ to 37′ 7″
3.	Four-foot bed, . .	4′ 5″ to 42′ 5″	4′ 4″ to 41′ 11″
4.	Sandstone, ...	64′ 0″ to 106′ 5″	63′ 0″ to 104′ 11″
5.	Slate, ...	7′ 8″ to 114′ 1″	7′ 6″ to 112′ 5″
6.	Six-foot bed, . . .	6′ 1″ to 120′ 2″	6′ 0″ to 118′ 5″
7.	Sandstone, ...	54′ 0″ to 174′ 2″	53′ 2″ to 171′ 7″
8.	Coal, ...	1′ 3″ to 175′ 5″	1′ 2″ to 172′ 9′

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to the dip.
9.	Sandstone, ...	50' 9'' to 226' 2''	50' 0'' to 222' 9''
10.	Eleven-foot or Cooper bed, . . .	8' 11'' to 235' 1''	8' 9'' to 231' 6''
11.	Slate, ...	28' 0'' to 263' 1''	27' 7'' to 259 1''
12.	Nine-foot or Bennett bed, ...	8' 10' to 271' 11''	8' 8'' to 267' 9''

See Columnar Section No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Rope Drill bore-hole, 500 feet north of Mount Thomas drift, Forty Fort.

J. H. Swoyer.

(Reported by J. H. Swoyer.)

No. of strata.		Description.	Thicknesses measured vertically.	Thicknesses perpendicular to the dip.
Put down and used for artesian well.	1.	Surface, ...	29' 0'' to 29' 0''	29' 0'' to 29' 0''
	2.	Coal and slate. Dip 23° S., . .	7' 0'' to 36' 0''	6' 7'' to 35' 7''
	3.	Sandstone, . . .	77' 0'' to 113' 0''	72' 5'' to 108' 0''
	4.	Coal, ...	2' 6'' to 115' 6''	2' 4'' to 110' 4''
	5.	Sandstone, . . .	122' 6'' to 238' 0''	115' 1'' to 225' 5''
	6.	Conglomerate, .	100' 0'' to 338' 0''	94' 0'' to 319' 5''
	7.	Green shale, . .	205' 0'' to 543' 0''	192' 7'' to 512' 0''
	8.	Red shale, . . .	10' 8'' to 553' 8''	10' 0'' to 522' 0''

See Columnar Section Sheet. No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Forty Fort shaft, from surface to Eleven-foot bed.

J. H. Swoyer.

(Reported by J. H. Swoyer.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to the dip.
1.	Surface, ...	15' 0'' to 15' 0''	15' 0'' to 15' 0''
2.	Shaly sandstone, ...	21' 0'' to 36' 0''	21' 0'' to 36' 0''
3.	Four-foot, Cooper or Upper Baltimore bed, ...	4' 0'' to 40' 0''	4' 0'' to 40' 0''
4.	Slaty sandstone, ...	49' 0'' to 89' 0''	49' 0'' to 89' 0''
5.	Six-foot, Bennett or Lower Baltimore bed, ...	7' 0'' to 96' 0''	7' 0 ' to 96' 0''

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
6.	Hard sandstone, ...	50' 0" to 146' 0"	50' 0" to 146' 0"
7.	COAL, ...	1' 6" to 147' 6"	1' 6" to 147' 6"
8.	Hard sandstone, ...	46' 0" to 193' 6"	46' 0" to 193' 6"
9.	ELEVEN-FOOT BED, . .	11' 3" to 204' 9"	11' 3" to 204' 9"

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Diamond drill bore-hole, near Forty Fort Breaker, from surface to conglomerate.

(Reported by J. H. Swoyer.)

No. of strata	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Gravel, ...	4' 0" to 4' 0"	4' 0" to 4' 0"
2.	Sand and clay,.	5' 0" to 9' 0"	5' 0" to 9' 0"
3.	Stone and gravel, ...	10' 0" to 19' 0"	10 0" to 19' 0"
4.	Clay and gravel,	9' 10" to 28' 10"	9' 10" to 28' 10'
5.	Quicksand, . .	9' 3½" to 38' 1½"	9' 3½" to 38' 1½'
6.	Sand and clay,.	12' 10½" to 51' 0"	12' 10½" to 51' 0"
7.	Clay,.	14' 00" to 65' 0"	14' 0" to 65' 0"
8.	Coarse sand and COAL, ...	4' 9½" to 69' 9½"	4' 9½" to 69' 9½"
9.	Quicksand, . .	9' 8½" to 79' 6"	9' 8½" to 79' 6"
10.	Coarse sand, . .	1' 10" to 81' 4"	1' 10" to 81' 4"
11.	COAL BED, . . .	3' 8" to 85' 0"	3' 8" to 85' 0"
12.	Slate, ...	1' 6" to 86' 6"	1' 6" to 86' 6"
13.	Slate and SS. .	11" to 87' 5"	11" to 87' 5"
14.	Sandstone, . . .	21' 3" to 108' 8"	21' 3" to 108' 8"
15.	SS. with seams of slate and COAL, ...	4' 4" to 113 0"	4' 4" to 113' 0"
16.	SS. and cong. .	7' 0' to 120' 0"	7' 0' to 120' 0"
17.	Sandstone, . . .	1' 0" to 121' 0"	1' 0" to 121' 0"
18.	SS. and cong. .	10' 7" to 131' 7"	10' 7" to 131' 7"
19.	Sandstone, . . .	2' 0" to 133' 7"	2' 0" to 133' 7"
20.	Slate and COAL,	3' 1" to 136' 8"	3' 1" to 136' 8"
21.	COAL, ...	11" to 137' 7"	11" to 137' 7"
22.	SS. and slate, .	7' 7" to 145' 2"	7' 7" to 145' 2"
23.	Sandstone,. . .	22' 0' to 167' 2"	22' 0" to 167' 2"
24.	Sandstone with seams of COAL,	4' 0" to 171' 2"	4' 0" to 171' 2"
25.	Sandstone, . . .	11' 10" to 183' 0"	11' 10" to 183' 0"
26.	COAL, ...	2" to 183' 2"	2" to 183' 2"
27.	Sandstone, . . .	8" to 183' 10"	8" to 183' 10"
28.	Slate, ...	4' 6' to 188' 4"	4' 6" to 188' 4"
29.	COAL, ...	3' 7" to 191' 11"	3' 7" to 191' 11"
30.	Slate, ...	3' 1" to 195' 00"	3' 1" to 195' 0"

No. of strata.	*Description.*	*Thicknesses measured vertically.*					*Thicknesses perpendicular to the dip.*				
31.	COAL, ...	5'	10½''	to	200'	10½''	5'	10½''	to	200'	10½''
32.	Slate.	7'	9½''	to	208'	8''	7'	9½''	to	208'	8''
33.	Bony COAL, . .		4''	to	209'	0''		4''	to	209'	0''
34.	Slate, ...	4'	0''	to	213'	0''	4'	0''	to	213'	0'
35.	Slate and SS. .	12'	3''	to	225'	3''	12'	3''	to	225'	3''
36.	COAL BED, . . .	9'	8½''	to	234'	11½''	9'	8½''	to	234'	11½''
37.	SS. and slate, .	8'	2½''	to	243'	2'	8'	2½''	to	243'	2''
38.	Sandstone, . .	8'	0½''	to	251'	2½''	8'	0½''	to	251'	2½''
39.	Sandstone, . .	9'	0''	to	200'	1½''	9'	0''	to	260'	2½''
40.	SS. with COAL,	6'	8''	to	266'	10½''	6'	8''	to	266'	10½''
41.	Coarse SS. . .	1'	2''	to	268'	00½ '	1'	2''	to	268'	0½''
42.	SS. with COAL,	13'	1''	to	281'	1½''	13'	1''	to	281'	1½''
43.	Slate, ...	2'	3''	to	283'	4½''	2'	3''	to	283'	4½''
44.	COAL and bone,	1'	5''	to	284'	9½''	1'	5''	to	284	9½''
45.	Slate, ...	1'	7½''	to	286'	5 '	1'	7½''	to	286'	5''
46.	Slate and bone,	5'	9½''	to	292'	2½''	5'	9½''	to	292'	2½''
47.	Slate and COAL,	1'	0''	to	293'	2½''	1'	0 '	to	293'	2½''
48.	Slate, ...	5'	2''	to	298'	4½''	5'	2''	to	298'	4½''
49.	Bony COAL, . .		4''	to	298	8½''		4''	to	298'	8½''
50.	Slate, ...	2'	6''	to	301'	2½''	2'	6 '	to	301'	2½''
51.	Slate with COAL,	9'	10½''	to	311'	1''	9'	10½''	to	311'	1''
52.	Slate with SS. .	8'	8½''	to	319'	9½''	8'	8½''	to	319'	9½'
53.	Sandstone, . . .	8'	6''	to	328'	3½''	8'	6'	to	328'	3½''
54.	SS. and cong. .	2'	9½''	to	331'	1''	2'	9½''	to	331'	1''
55.	Sandstone, . . .	5'	0	to	336'	1''	5	0 '	to	336'	1''
56.	SS. and slate, .	3'	1''	to	339'	2''	3'	1''	to	339'	2''
57.	COAL BED, . . .	6	0''	to	345'	2''	6'	0''	to	345'	2''
58.	Slate and SS. .	1'	11''	to	347'	1''	1'	11''	to	347'	1''
59.	Sandstone, . . .	17'	5''	to	364'	6''	17'	5''	to	364'	6''
60.	Sandstone, . . .	7'	7'	to	372'	1''	7'	7''	to	372'	1''
61.	Fine cong. . . .	2'	3½''	to	374'	4½''	2'	3½''	to	374	4½''
62.	SS. and cong. .	7'	2	to	381'	6½''	7'	2''	to	381'	6½'
63.	SS. and cong. .	1'	0''	to	382'	6½''	1	0''	to	382'	6½''
64.	COAL BED, . . .	2'	3½''	to	384'	10''	2'	3½''	to	384'	10''
65.	Slate, ...	3'	0''	to	387'	10 '	3'	0''	to	387	10''
66.	Sandstone, . . .	2'	8½''	to	390'	6½''	2'	8½''	to	390'	6½ '
67.	Sandstone with seams of slate,	23'	3''	to	413'	9½''	23'	3''	to	413'	9½''
68.	Sandstone, . . .	13'	8''	to	427'	5½''	13'	8''	to	427'	5½''
69.	SS. with cong. .	7'	11''	to	435'	4½'	7'	11''	to	435'	4½''
70.	Conglomerate, .	11'	1''	to	446'	5½''	11'	1''	to	446'	5½''

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Northern Anthracite Field, Part I.

Section of Diamond Drill bore-hole, on line between Swoyer & Maltby properties, 540 feet north of D. L. & W. R. R.

J. H. Swoyer.

(Reported by J. H. Swoyer.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Sand, ...	6′ 0″ to 6′ 0″	6′ 0″ to 6′ 0″
2.	Gravel, . . .	4′ 0″ to 10 0″	4′ 0″ to 10′ 0″
3.	Sand, ...	2′ 0″ to 12′ 0″	2′ 0″ to 12′ 0″
4.	Gravel, . . .	19′ 0″ to 31 0″	19′ 0″ to 31′ 0′
5.	Sand, ...	20′ 0″ to 51′ 0″	20′ 0″ to 51′ 0″
6.	Quicksand,. .	15′ 0″ to 66′ 0″	15′ 0″ to 66′ 0″
7.	Clay,.	46′ 0″ to 112′ 0″	46′ 0″ to 112′ 0″
8.	Quicksand, .	18′ 0″ to 130′ 0″	18′ 0″ to 130′ 0″
9.	Quicksand and clay, . .	14′ 3″ to 144′ 3″	14′ 3″ to 144′ 3″
10.	Sandstone, . .	55′ 0″ to 199′ 3″	55′ 0″ to 199′ 3″
11.	COAL BED, . .	6′ 0½″ to 205 3½″	6′ 0½″ to 205′ 3½″
12.	Sandstone. . .	43′ 7″ to 248′ 10½″	43′ 7″ to 248′ 10½″
13.	Sandstone with slate seams, . . .	4′ 0″ to 252′ 10½″	4 0″ to 252′ 10½″
14.	SS. and slate,	6′ 0″ to 258′ 10½″	6′ 0″ to 258′ 10½″
15.	Sandstone, . .	2 6″ to 261′ 4½″	2′ 6″ to 261′ 4½″
16.	Slate, ...	2′ 8″ to 264′ 0½″	2′ 8″ to 264′ 0½′
17.	COAL BED, . .	5′ 6″ to 269′ 6½″	5′ 6″ to 269′ 6½″
18.	Slate, ...	1′ 4″ to 270′ 10½″	1′ 4″ to 270′ 10½″
19.	Sandstone, . .	49′ 8½″ to 320′ 7″	49′ 8½″ to 320′ 7″
20.	COAL, ...	1′ 3½″ to 321′ 10½″	1′ 3½″ to 321′ 10½′
21.	Slate, ...	7′ 10″ to 329′ 8½″	7′ 10″ to 329′ 8½″
22.	Sandstone, . .	24′ 9″ to 354′ 5½″	24′ 9″ to 354′ 5½
23.	Slate, ...	4″ to 354′ 9½″	4″ to 354 9½
24.	COAL, ...	1′ 6″ to 356′ 3½″	1′ 6″ to 356′ 3½
25.	Slate,.	3′ 0″ to 359′ 3½″	3′ 0″ to 359 3½′
26.	Sandstone, . .	9′ 10″ to 369′ 1½″	9′ 10″ to 369′ 1½′
27.	SS. and slate,	4′ 0″ to 373′ 1½″	4′ 0″ to 373′ 1½″
28.	Sandstone,. .	4′ 6″ to 377′ 7″	4′ 6″ to 377′ 7½″
29.	SS. and slate,	6′ 0″ to 383′ 7½″	6′ 0″ to 383′ 7½″
30.	Slate with COAL seams,.	3′ 11″ to 387′ 6½″	3′ 11″ to 387′ 6½″
31.	COAL BED, . .	4 7½″ to 392′ 2″	4′ 7½″ to 392′ 2″
32.	Slate, ...	1′ 3½″ to 393′ 5½″	1′ 3½″ to 393′ 5½″
33.	Slate and SS.	1′ 0″ to 394′ 5½″	1′ 0″ to 394′ 5½″
34.	Slate, ...	11′ 4″ to 405′ 9½″	11′ 4″ to 405′ 9½″
35.	Slate and COAL, ...	11″ to 406′ 8½″	11″ to 406′ 8½″
36.	Slate and SS.	26′ 9″ to 433′ 5½″	26′ 9″ to 433′ 5½″
37.	COAL and bone, ...	1′ 10″ to 435′ 3½″	1′ 10″ to 435′ 3½″

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to the dip.
38.	Slate and SS.	5′ 6″ to 440′ 9½″	5′ 6″ to 440′ 9½″
39.	SS. with COAL seams, ...	20′ 2″ to 460′ 11½″	20′ 2′ to 460′ 11½″
40.	Sandstone, . .	24′ 0″ to 484′ 11½″	24′ 0″ to 484′ ·11½′
41.	Slate, ...	11′ 7″ to 496′ 6½″	11′ 7″ to 496′ 6½″
42.	COAL, ...	2′ 5″ to 498′ 11½″	2′ 5″ to 498′ 11½″
43.	Slate, ...	5′ 7″ to 504′ 6½″	5′ 7″ to 504′ 6½″
44.	Slate and SS.	7′ 3″ to 511′ 9½″	7′ 3″ to 511′ 9½″
45.	Sandstone, . .	2′ 6″ to 514′ 3½″	2′ 6″ to 514′ 3½″
46.	SS. and slate,	9′ 6″ to 523′ 9½″	9′ 6″ to 523′ 9½″
47.	Slate, ...	5′ 0″ to 528′ 9½″	5′ 0″ to 528′ 9½″
48.	COAL BED, . .	14′ 9½″ to 543′ 7″	14 9½′ to 543′ 7 ′
49.	Slate, ...	15′ 5″ to 559 0″	15′ 5″ to 559 0″
50.	Sandstone, . .	12′ 5½″ to 571′ 5½′	12′ 5½′· to 571′ 5½″
51.	COAL with slate, ...	19′ 11″ to 591 4½″	19′ 11″ to 591′ 4½″
52.	Slate, ...	1′ 9″ to 593′ 1½″	1′ 9 ′ to 593′ 1½″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of "Harry E" tunnel, from surface to small coal seam at 288′ 10″.

J. H. Swoyer.

(Measured by Geological Survey.)

No. of strata.	Description.		Thicknesses measured horizontally.	Thicknesses perpendicular to the dip.
1.	Slaty sandstone, . .		208′ 3″ to 208′ 3″	55′ 0″ to 55′ 0″
2.	COAL, ...		1′ 5″ to 209′ 8″	1′ 0″ to 56′ 0″
3.	Fine dark SS. . . .		108′ 4″ to 318′ 0″	30′ 6″ to 86′ 6″
4.	ELEVEN-FOOT BED. Bed in roll, . . .		60′ 6′ to 378′ 6″	12′ 7″ to 99 1″
5.	Hard sandstone, . .		153′ 0″ to 531′ 6″	38′ 5″ to 137′ 6″
6.	COAL.		13′ 0″ to 544′ 6″	4 0″ to 141′ 6″
7.	Slate, ...		3′ 0″ to 547′ 6″	1′ 8″ to 143′ 2″
8.	Hard sandstone, . .		104′ 0″ to 651′ 6″	37′ 6″ to 180′ 8″
9.	Slate, ...		3′ 0′ to 654′ 6″	10″ to 181′ 6″
10.	COAL.		8′ 0″ to 662′ 6″	3′ 0″ to 184′ 6 ′
11.	Hard sandstone, . .		32′ 0″ to 694′ 6″	12′ 0″ to 196′ 6″
12.	Slate, ...		14′ 0″ to 708′ 6″	5′ 8″ to 202′ 2″
13.	ROSS BED.		31′ 0″ to 739′ 6″	14′ 2″ to 216′ 4″
14.	Strata,		(14 to 17 taken on north side of roll.)	51′ 6″ to 267′ 10″
15.	COAL, ...	REDASH BED.	. . . .	3′ 2″ to 271′ 0″
16.	Strata, ...		. . . .	15′ 0″ to 286′ 0″
17.	COAL, ...		. . . .	2′ 10″ to 288′ 10″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

NOTE.—Horizontal measurements could not be continued beyond No. 13 on account of roll in strata.

Section of "Harry E" shaft and Diamond Drill bore-hole, from surface to Red Ash bed.

J. H. Swoyer.

(Reported by J. H. Swoyer.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*			*Thicknesses perpendicular to the dip.*		
1.	Surface, ...	85′ 0″	to	85′ 0″	85′ 0″	to	85′ 0″
2.	COAL (trace.)						
3.	SS. Dip 4° S., . .	8′ 0″	to	93′ 0″	7′ 11″	to	92′ 11″
4.	COAL, ...	9″	to	93′ 9″	9″	to	93′ 8″
5.	Slate, ...	8′ 0″	to	101′ 9″	7′ 11″	to	101′ 7″
6.	Sandstone, ...	62′ 6″	to	164′ 3″	62′ 2″	to	163′ 9″
7.	ELEVEN-FOOT BED,	10′ 3″	to	174′ 6′	10′ 3″	to	174′ 0″
8.	Sandstone slate, . .	11′ 0″	to	185′ 6″	10′ 11″	to	184′ 11″
9.	Sand slate, ...	4′ 0″	to	189′ 6″	3′ 11″	to	188′ 10″
10.	Sandstone, ...	2′ 0¾″	to	191′ 6¾″	1′ 11″	to	190′ 9″
11.	Sandstone and slate,	15′ 0″	to	206′ 6¾″	14′ 11″	to	205′ 8″
12.	Bony COAL, ...	3″	to	206′ 9¾″	3″	to	205′ 11″
13.	Sandstone and slate,	2′ 8″	to	209′ 5¾″	2′ 7″	to	208′ 6″
14.	Slate with COAL seams, ...	6′ 8″	to	216′ 1¾″	6′ 7″	to	215′ 1″
15.	Bony COAL, ...	2′ 0″	to	218′ 1¾″	2′ 0″	to	217′ 1″
16.	Sandstone, ...	19′ 10″	to	237′ 11¾″	19′ 8″	to	236′ 9″
17.	Conglomerate, . .	11′ 9″	to	249′ 8¾″	11′ 7″	to	248′ 4″
18.	Sandstone, ...	4′ 11″	to	254′ 7¾″	4′ 10″	to	253′ 2″
19.	Fine conglomerate,	6′ 7″	to	261′ 2¾″	6′ 6″	to	259′ 8″
20.	COAL, ...	1′ 4″	to	262′ 6¾″	1′ 4″	to	261′ 0″
21.	Slate, ...	3″	to	262′ 9¾″	3″	to	261′ 3″
22.	Sandstone, ...	3′ 6″	to	266′ 3¾″	3′ 5″	to	264′ 8″
23.	Sandstone and slate,	5′ 9″	to	272′ 0¾″	5′ 8″	to	270′ 4″
24.	Sandstone, ...	21′ 7″	to	293′ 7¾″	21′ 5″	to	291′ 9″
25.	Sandstone and slate,	3′ 0″	to	296′ 7¾″	2′ 11″	to	294′ 8″
26.	Slate, ...	8′ 9″	to	305′ 4¾″	8′ 8″	to	303′ 4″
27.	Ross BED, ...	17′ 10½″	to	323′ 3¼″	17′ 6″	to	320′ 10″
28.	Sandstone and slate,	2′ 0″	to	325′ 3¼″	2′ 0″	to	322′ 10″
29.	Slate, ...	4′ 2½″	to	329′ 5¾″	4′ 2″	to	327′ 0″
30.	Sandstone, ...	49′ 0″	to	378′ 5¾″	48′ 8″	to	375′ 8″
31.	RED ASH BED, . .	9′ 0½″	to	387′ 6¼″	8′ 10″	to	384′ 6″
32.	Slate, ...	8′ 6″	to	396′ 0¼″	8′ 5″	to	392′ 11″
33.	Sandstone, ...	1′ 6″	to	397′ 6¼″	1′ 6″	to	394′ 5″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Tripp Farm Rope Drill bore-hole No. 1, from surface through wash.

J. H. Swoyer.

(Reported by J. H. Swoyer.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Sand and gravel, .	25' 0'' to 25' 0''	25' 0'' to 25' 0''
2.	Quicksand, ...	70' 0'' to 95' 0''	70' 0'' to 95' 0''
3.	Soft clay, ...	100' 0'' to 195' 0'	100' 0'' to 195' 0''
4.	Water and gravel,	10' 0'' to 205' 0''	10' 0'' to 205' 0''
5.	Boulders and broken rock, ...	10' 0'' to 215' 0''	10' 0'' to 215' 0''

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Tripp Farm Rope Drill bore-hole No. 2, near Mill Hollow, from surface through coal bed at 590' 2'' into quartz rock at 638' 2''

J. H. Swoyer.

(Reported by I. A. Stearns, M. E.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Gravel and quicksand, ...	30' 0'' to 30' 0''	30' 0'' to 30' 0''
2.	Quicksand, ...	60' 0'' to 90' 0''	60' 0'' to 90' 0''
3.	Soft blue clay, . .	60' 0'' to 150' 0''	60' 0'' to 150' 0''
4.	Hard, ...	2' 0'' to 152' 0''	2' 0'' to 152' 0''
5.	Hard blue clay, .	20' 0'' to 172' 0''	20' 0'' to 172' 0''
6.	Soft blue clay, . .	15' 0'' to 187' 0''	15' 0'' to 187' 0''
7.	Gravel, ...	4' 6'' to 191' 6''	4' 6'' to 191' 6''
8.	Soft sandstone, . .	5' 0'' to 196' 6''	5' 0'' to 196' 6''
9.	Coarse sandstone,	24' 0'' to 220' 6''	24' 0'' to 220' 6''
10.	Fine sandstone, .	23' 0'' to 243' 6''	23' 0'' to 243' 6''
11.	Coarse sandstone,	15' 0'' to 258' 6''	15' 0'' to 258' 6''
12.	Slate, ...	1' 0 to 259' 6''	1' 0'' to 259' 6''
13.	COAL BED, ...	5' 1'' to 264' 7''	5' 1'' to 264' 7''
14.	Soft sandstone, . .	4' 0'' to 268' 7''	4' 0'' to 268' 7''
15.	Quartz, ...	8' 0'' to 276' 7''	8' 0'' to 276' 7''
16.	Soft slate, ...	9' 0'' to 285' 7''	9' 0'' to 285' 7''
17.	Fire clay, ...	68' 0'' to 353' 7''	68' 0'' to 353' 7''
18.	Hard sandstone, .	159' 0'' to 512' 7''	159' 0'' to 512' 7''
19.	Fire clay and SS. .	8' 0'' to 520' 7''	8' 0'' to 520' 7''
20.	Hard sandstone, .	4' 0'' to 524' 7'	4' 0'' to 524' 7''
21.	Soft sandstone, . .	44' 0'' to 568' 7''	44' 0'' to 568' 7''
22.	Fire clay, ...	4' 9'' to 573' 4'	4' 9'' to 573' 4''

No. of strata.	*Description.*		*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
23.	Slate,		9″ to 574′ 1″	9″ to 574′ 1″
24.	COAL,	COAL BED.	9″ to 574′ 10″	9″ to 574′ 10″
25.	Sandstone,		3′ 0″ to 577′ 10″	3′ 0″ to 577′ 10″
26.	COAL,		1′ 9″ to 579′ 7″	1′ 9″ to 579′ 7″
27.	Sandstone,		6′ 0″ to 585′ 7″	6′ 0″ to 585′ 7″
28.	Slate.		6″ to 586′ 1″	6″ to 586′ 1″
29.	COAL BED,		4′ 1″ to 590′ 2″	4′ 1″ to 590′ 2″
30.	Fire clay,		8′ 3″ to 598′ 5″	8′ 3″ to 598′ 5″
31.	Soft sandstone,		15′ 0″ to 613′ 5″	15′ 0″ to 613′ 5″
32.	Quartz rock,		24′ 9″ to 638′ 2″	24′ 9″ to 638′ 2″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Trip Farm Rope Drill bore-hole No. 3, near Mill Hollow, from surface to conglomerate.

J. H. Swoyer.

(Reported by Thomas H. Broderick.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Surface,	87′ 0″ to 87′ 0″	87′ 0″ to 87′ 0″
2.	Dark SS. Dip 8° S.,	31′ 0″ to 118′ 0″	30′ 7″ to 117′ 7″
3.	Quartz rock,	8′ 0″ to 126′ 0″	7′ 11″ to 125′ 6″
4.	Gritty slate,	25′ 0″ to 151′ 0″	24′ 8″ to 150′ 2″
5.	White flint rock,	17′ 0″ to 168′ 0″	16′ 9″ to 166′ 11″
6.	COAL BED,	10′ 0″ to 178′ 0″	9′ 10″ to 176′ 9″
7.	Slate,	8′ 0″ to 186′ 0″	7′ 11″ to 184′ 8″
8.	Mica sandstone,	42′ 0″ to 228′ 0″	41′ 5″ to 226′ 1″
9.	Black slate with seams of COAL,	11′ 0″ to 239′ 0″	10′ 10′ to 236′ 11″
10.	Hard quartz rock,	47′ 0″ to 286′ 0″	46′ 4″ to 283′ 3″
11.	Slate and COAL seams,	11″ to 286′ 11″	11″ to 284′ 2″
12.	Dark sandstone,	7′ 1″ to 294′ 0″	7′ 0″ to 291′ 2″
13.	Hard coarse rock,	19 0″ to 313′ 0″	18′ 9″ to 309′ 11″
14.	Sand rock,	3′ 9′ to 316′ 9″	3 8″ to 313′ 7″
15.	Slate,	1′ 6″ to 318′ 3″	1′ 6″ to 315′ 1″
16.	COAL BED,	4′ 5″ to 322′ 8″	4′ 4″ to 319′ 5″
17.	Sandstone,	1′ 2″ to 323′ 10″	1′ 2″ to 320′ 7″
18.	Slate,	18′ 6″ to 342′ 4″	18′ 3″ to 338′ 10″
19.	COAL BED,	5′ 2″ to 347′ 6′	5′ 1″ to 343′ 11″
20.	Slate,	2′ 0″ to 349′ 6″	2′ 0″ to 345′ 11″
21.	Hard quartz rock,	19′ 0″ to 369′ 6″	18′ 9″ to 361′ 8″
22.	Sandstone and COAL seams,	5′ 0″ to 373′ 6″	4′ 11″ to 369′ 7″
23.	Quartz rock,	22′ 0″ to 395′ 6″	21′ 8″ to 391′ 3″
24.	Sandstone,	3′ 7″ to 399′ 1″	3′ 6″ to 394′ 9″
25.	COAL BED,	8′ 8″ to 407′ 9″	8′ 6″ to 403′ 3″
26.	Slate,	4′ 4″ to 412 1″	4′ 3″ to 407′ 6″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
27.	Hard sandstone,	25′ 5″ to 437′ 6″	25′ 1″ to 432′ 7″
28.	Slate,	11′ 0″ to 448′ 6″	10 10″ to 443′ 5′
29.	Conglomerate,	18′ 6″ to 467′ 0″	18′ 3″ to 461′ 8″
30.	Hard quartz rock,	3′ 6″ to 470′ 6″	3′ 5″ to 465′ 1″
31.	Conglomerate,	6′ 0″ to 476′ 6″	5′ 11″ to 471′ 0″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Mill Hollow shaft, from surface to Ross bed.

Waddle & Walter.

(Measured by Geological Survey.)

No. of strata.	*Description.*		*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
1.	Surface,		60′ 0″ to 60′ 0″	60′ 0″ to 60′ 0″
2.	Soft slate. Dip 3° S.,		38 0″ to 98′ 0″	37′ 11″ to 97′ 11″
3.	COOPER BED,		7′ 11″ to 105′ 11″	7′ 10″ to 105′ 9″
4.	Dark soft slate,		9′ 0″ to 114′ 11″	8′ 11″ to 114′ 8″
5.	Hard sandstone,		63′ 8″ to 178′ 7″	63′ 6″ to 178′ 2″
6.	Black slate,		2′ 0″ to 180′ 7′	2′ 0″ to 180′ 2″
7.	BENNETT BED,		12′ 7″ to 193′ 2″	12′ 7″ to 192′ 9″
8.	Slate. Dip 11° S.,		25′ 10″ to 219′ 0″	24′ 6″ to 217′ 3″
9.	Slate, COAL and bone,		2′ 8″ to 221′ 8″	2′ 8″ to 219′ 11″
10.	Slate,		1′ 1″ to 222′ 9″	1′ 1″ to 221′ 00″
11.	Slate, COAL and bone,		8′ 3″ to 231′ 0′	8′ 2″ to 229′ 2″
12.	Hard gray SS.		19′ 3″ to 250′ 3″	19′ 1″ to 248′ 3″
13.	Slate,		1′ 10″ to 252′ 1″	1′ 10″ to 250′ 1″
14.	Slate and bone,		1′ 10″ to 253′ 11″	1′ 10″ to 251′ 11″
15.	Hard bastard SS.		34′ 4″ to 288′ 3″	24′ 0″ to 275′ 11″
16.	Hard gray SS. with cong. seams,		66′ 5″ to 354′ 8″	65′ 7″ to 341′ 6″
17.	Slate,		3′ 6″ to 358′ 2″	3′ 6″ to 345′ 0″
18.	Sandstone,		9′ 1″ to 367′ 3″	9′ 0″ to 354′ 0″
19.	Slate,		18′ 6″ to 385′ 9″	18′ 3″ to 372′ 0″
20.	COAL BED (Rider),		2′ 2″ to 387′ 11″	2′ 2″ to 374′ 5″
21.	Slate,		12′ 9′ to 400′ 8″	12′ 7″ to 387′ 0″
22.	COAL,	ROSS BED.	3′ 0″ to 403′ 8″	3′ 0″ to 390′ 0″
23.	Slate,		1′ 2″ to 404′ 10″	1′ 2″ to 391′ 2″
24.	COAL,		6′ 9″ to 411′ 7″	6′ 8″ to 397′ 10″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Black Diamond shaft from surface to Bennett bed.

Haddock and Steele.

(Reported by I. A. Stearns, M. E.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface,	70′ 0″ to 70′ 0″	70′ 0″ to 70′ 0″
2.	Loose SS. Dip 6° S.,	20′ 0′ to 90′ 0′	19′ 9″ to 89′ 9″
3.	LANCE BED,	7′ 0″ to 97′ 0	6′ 11″ to 96′ 8″
4.	Sandstone,	68′ 0′ to 165′ 0″	67′ 3″ to 163′ 11″
5.	COOPER BED,	8′ 0′ to 173′ 0′	7′ 11″ to 171′ 10″
6.	Sandstone,	46′ 3″ to 219 3″	45′ 11″ to 217′ 9″
7.	BENNETT BED,	12′ 4″ to 231′ 7′	12′ 3″ to 230′ 0″

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of East Boston shaft, from surface to Red Ash bed.

W. G. Payne & Co.

(Nos. 1—17 reported by E. F. Payne. Nos. 18—40 measured by Geological Survey.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip
1.	Surface,	15′ 0″ to 15′ 0″	15′ 0″ to 15′ 0″
2.	Sandstone,	51′ 7″ to 66′ 7″	51 7″ to 66′ 7″
3.	Slate,	9″ to 67′ 4″	9″ to 67′ 4″
4.	ORCHARD BED,	4′ 0″ to 71′ 4″	4′ 0″ to 71′ 4″
5.	Slate,	4′ 5″ to 75′ 9″	4′ 5″ to 75′ 9″
6.	Hard sandstone,	34′ 10″ to 110′ 7″	34′ 10″ to 110′ 7″
7.	Slaty sandstone,	23′ 5″ to 134′ 0″	23′ 5″ to 134′ 0″
8.	LANCE BED,	5′ 2″ to 139′ 2″	5′ 2″ to 139′ 2″
9.	Hard sandstone,	23′ 7″ to 162′ 9″	23′ 7″ to 162′ 9″
10.	COAL,	1′ 6″ to 164′ 3″	1′ 6″ to 164′ 3″
11.	Slate,	4′ 5″ to 168′ 8″	4′ 5″ to 168′ 8″
12.	COOPER BED,	6′ 0″ to 174′ 8″	6′ 0″ to 174′ 8″
13.	Sandstone,	79′ 8″ to 254′ 4″	79′ 8″ to 254′ 4″
14.	Slate,	1′ 6″ to 255′ 10″	1′ 6″ to 255′ 10″
15.	COAL,	2′ 0″ to 257′ 10″	2′ 0″ to 257′ 10″
16.	Fire clay,	9″ to 258′ 7″	9″ to 258′ 7″
17.	BENNETT BED,	10′ 0″ to 268′ 7″	10′ 0″ to 268′ 7″
18.	Slate,	5′ 10″ to 274′ 5″	5′ 10″ to 274′ 5″
19.	COAL,	1′ 9″ to 276′ 2″	1′ 9″ to 276′ 2″
20.	Hard sandstone,	25′ 10″ to 302′ 0″	25′ 10″ to 302′ 0″

No. of strata.	*Description.*		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
21.	Slate, ...		16' 2'' to 318' 2''	16' 2'' to 318' 2''
22.	Slate, bone and COAL,		9' 6'' to 327' 8''	9' 6'' to 327' 8''
23.	Sandstone, ...		21' 1'' to 348' 9''	21' 1'' to 348' 9''
24.	Conglomerate, . . .		15' 1'' to 363' 10''	15' 1'' to 363' 10''
25.	Hard sandstone, . .		16' 0'' to 379' 10''	16' 0'' to 379' 19''
26.	Slate, ...		5' 8'' to 385' 6''	5' 8'' to 385' 6''
27.	SS. and cong., . .		37' 3'' to 422' 9''	37' 3'' to 422' 9''
28.	White pebbles, . .		10'' to 423' 7''	10'' to 423' 7''
29.	Sandstone, ...		11' 0'' to 434' 7''	11' 0'' to 434' 7''
30.	Bone and slate, . .		6'' to 435' 1''	6'' to 435' 1''
31.	Conglomerate, . . .		18' 0'' to 453' 1''	18' 0'' to 453' 1''
32.	Slate, ...		24' 0'' to 477' 1''	24' 0'' to 477' 1''
33.	COAL, ...		2' 6'' to 479' 7''	2' 6'' to 479' 7''
34.	Slate, ...		8'' to 480' 3''	8'' to 480' 3''
35.	COAL,	} ROSS BED,	7' 6'' to 487' 9''	7' 6'' to 487' 9''
36.	Slate,		10'' to 488' 7''	10'' to 488' 7''
37.	COAL,		4' 6'' to 493' 1''	4' 6'' to 493' 1''
38.	Sandstone and slate,		2' 6'' to 495' 7''	2' 6'' to 495' 7''
39.	Sandstone, ...		43' 5'' to 539' 0''	43' 5'' to 539' 0''
40.	Slate, ...		11' 6'' to 550' 6''	11' 6'' to 550' 6''
41.	RED ASH BED. . . .			

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

No. 41 was not measured; being covered with water at time section was taken.

Section of Kingston No. 1 shaft from surface through Checker bed at 347' 4' 'into sandstone 349' 10''.

Kingston Coal Co.

(Reported by Kingston Coal Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	17' 0'' to 17' 0'	17' 0'' to 17' 0''
2.	SS. Dip 6° S., . .	82' 0'' to 99' 0''	81' 6'' to 98' 6''
3.	COAL BED, ...	5' 0'' to 104' 0''	5' 0'' to 103' 6''
4.	Slate, ...	2' 0'' to 106' 0''	2' 0'' to 105' 6''
5.	Sandstone, ...	17' 6'' to 123' 6''	17' 5'' to 122' 11''
6.	Slate, ...	8' 6'' to 132' 0 '	8' 5'' to 131' 4''
7.	Fire clay, ...	5' 0'' to 137' 0''	5' 0'' to 136' 4''
8.	Sandstone, ...	26' 6'' to 163' 6''	26' 4'' to 162' 8''
9.	Sandstone, ...	30' 6'' to 194' 0''	30' 4'' to 193 0''
10.	Fire clay, ...	6' 0'' to 200' 0''	6' 0'' to 199' 0''
11.	Hard slate, ...	12' 0'' to 212' 0''	12' 0'' to 211' 0''
12.	LANCE BED, ...	7' 0'' to 219' 0''	7' 0'' to 218' 0''

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
13.	Sandstone, ...	47′ 0″ to 266′ 0′	46 9″ to 264′ 9″
14.	Slate,.	5′ 6″ to 271′ 6″	5′ 6″ to 270′ 3″
15.	COOPER BED, . . .	9′ 6″ to 281 0″	9′ 5″ to 279′ 8″
16.	Sandstone, ...	52′ 6″ to 333′ 6′	52′ 2″ to 331′ 10″
17.	BENNETT BED, . .	7′ 0″ to 340′ 6″	7′ 0″ to 338′ 10″
18.	Slate, ...	3′ 6″ to 344′ 0″	3′ 6″ to 342′ 4′
19.	COAL, ...	5′ 0″ to 349′ 0″	5′ 0″ to 347′ 4″
20.	Sandstone, ...	2′ 6″ to 351′ 6″	2′ 6′ to 349′ 10′

See Columnar Section Sheet No. III and Mine Sheet No. VII, Atlas Northern Anthracite Field, Part I.

Section of Boston shaft from surface to Baltimore bed.

D. & H. C. Co.

(Reported by D. L. & W. R. R. Co.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	25′ 0″ to 25′ 0″	25′ 0′ to 25′ 0″
2.	Sandstone, ...	33′ 0″ to 58′ 0″	33′ 0″ to 58′ 0″
3.	LANCE BED, . . .	7′ 10″ to 65′ 10′	7′ 10″ to 65′ 10″
4.	Sandstone, ...	4′ 0″ to 69′ 10″	4′ 0″ to 69′ 10″
5.	Slate,.	8′ 0″ to 77′ 10″	8′ 0″ to 77′ 10″
6.	Sandstone, ...	42′ 0″ to 119′ 10″	42′ 0″ to 119′ 10″
7.	Slate,.	20′ 0″ to 139′ 10″	20′ 0″ to 139′ 10″
8.	BALTIMORE BED,	24′ 3 to 164′ 1″	24′ 3″ to 164′ 1″

See Columnar Section Sheet No. III and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Rope Drill bore-hole near Boston mines, from surface to Cooper bed.

D. & H. C. Co.

(Reported by D. L. & W. R. R. Co.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	25′ 0″ to 25′ 0″	25′ 0″ to 25′ 0″
2.	Sandstone,.	51′ 0″ to 76 0″	51′ 0″ to 76 0″
3.	Slate,.	10′ 6″ to 86′ 6″	10′ 6″ to 86′ 6″
4.	COAL BED, ...	7′ 10″ to 94′ 4″	7′ 10″ to 94′ 4″
5.	Sandstone, ...	46′ 0′ to 140′ 4″	46′ 0′ to 140′ 4′
6.	Slate,.	17′ 9″ to 158′ 1″	17′ 9″ to 158 1″
7.	COOPER BED, . . .	9′ 6″ to 167′ 7″	9′ 6″ to 167′ 7″
8.	Slate, ...	4 9″ to 172′ 4″	4′ 9″ to 172′ 4″

See Columnar Section Sheet No. III and Mine Sheet No. V, Atlas Northern Anthracite Field, Part I.

Section of Dorrance shaft near WilkesBarre, from surface to Hillman Bed.

L. V. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Cribbing,	15′ 4″ to 15′ 4″	15′ 4″ to 15′ 4″
2.	Slate. Dip 38° S.,	45′ 10″ to 61′ 2″	36′ 1″ to 51′ 5″
3.	COAL and dirt,	3′ 6″ to 64′ 8″	2′ 10″ to 54′ 3″
4.	Slate. Dip 39° S.,	9′ 1″ to 73′ 9″	7′ 2″ to 61′ 5″
5.	Sandstone, soft,	2′ 7″ to 76′ 4″	2′ 1″ to 63′ 6″
6.	Slate with ore balls,	26′ 10″ to 103′ 2″	21′ 1″ to 84′ 7″
7.	Sandstone,	6′ 11″ to 110′ 1″	5′ 5″ to 90′ 0″
8.	Slate. Dip 37° S.,	4′ 4″ to 114′ 5″	3′ 4″ to 93′ 4″
9.	Sandstone, hard,	14′ 1″ to 128′ 6″	11′ 1″ to 104′ 5″
10.	Slate,	2′ 4″ to 130′ 10″	1′ 10″ to 106′ 3″
11.	COAL,	1′ 11″ to 132′ 9″	1′ 10″ to 108′ 1″
12.	Bastard sandstone,	52′ 0″ to 184′ 9″	41′ 0″ to 149′ 1″
13.	Sandstone,	21′ 1″ to 205′ 10″	16′ 8″ to 165′ 9″
14.	Slate, soft,	1′ 11″ to 207′ 9″	1′ 6″ to 167′ 3″
15.	Slate, hard,	16′ 0″ to 223′ 9″	12 7″ to 179′ 10″
16.	COAL,	2′ 8″ to 226′ 5″	1′ 10″ to 181′ 8″
17.	Sandstone, hard,	13′ 10″ to 240′ 3″	11′ 0″ to 192′ 8″
18.	Slate and sandstone,	9′ 5″ to 249′ 8″	7 5″ to 200′ 1″
19.	Sandstone,	16′ 7′ to 266′ 3″	13′ 1″ to 213′ 2″
20.	Slate and fire clay,	2′ 10″ to 269′ 1″	2′ 2″ to 215′ 4″
21.	Bastard sandstone,	31′ 4″ to 300′ 5″	24′ 9″ to 240′ 1″
22.	Sandstone,	18′ 6″ to 318′ 11″	14′ 7″ to 254′ 8″
23.	Slate,	7′ 2″ to 326 1′	7′ 0″ to 261′ 8
24.	ROCK BED,	10′ 0′ to 336′ 1″	7′ 2″ to 268′ 10″
25.	Slate,	2′ 4″ to 338′ 5″	3 2″ to 272′ 0″
26.	COAL,	3′ 6″ to 341 11′	2 6″ to 274′ 6″
27.	Bastard sandstone,	15′ 5″ to 357′ 4″	12′ 2″ to 286′ 8″
28.	Sandstone, hard,	37′ 4″ to 394′ 8″	29′ 5″ to 316′ 1″
29.	Slate,	10′ 10″ to 405′ 6″	8′ 6″ to 324′ 7″
30.	ABBOTT BED. Dip 24° S.,	6′ 6″ to 412′ 0″	5′ 6′ to 330′ 1″
31.	Sandstone,	37′ 9″ to 451′ 9″	36′ 0″ to 366′ 1″
32.	Fire clay,	6′ 4″ to 458′ 0″	5′ 9″ to 371′ 10″
33.	Sandstone,	5′ 1″ to 463′ 1″	4′ 7″ to 376′ 5″
34.	Slate,	8′ 4′ to 471′ 4″	7′ 6″ to 383′ 11″
35.	Slaty sandstone,	16′ 6″ to 487′ 10″	14′ 11″ to 398′ 10″
36.	BOWKLEY BED,	5′ 4″ to 493′ 2″	7′ 7″ to 406′ 5′
37.	Slate, hard,	15′ 5″ to 508′ 7″	13′ 11″ to 420′ 4″
38.	Sandstone,	52′ 0″ to 560′ 7′	47′ 1″ to 467′ 5″
39.	Slate,	5′ 7″ to 566′ 2″	5′ 1″ to 472′ 6″
40.	HILLMAN BED,	13′ 5″ to 579′ 7″	13′ 5′ to 485′ 11″

See Columnar Section Sheet No. II and Mine Sheet No. VIII, Atlas Northern Antracite Field, Part I.

Section of Empire shaft No. 4 from surface to Hillman bed.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Cribbing,	35′ 8′ to 35′ 8″	35′ 8″ to 35′ 8″
2.	Hard SS.,	72′ 3″ to 107′ 11″	72′ 3″ to 107′ 11′
3.	Slate,	1′ 8″ to 109′ 7″	1′ 8″ to 109′ 7″
4.	Bone and slate,	3′ 7″ to 113′ 2″	3′ 7″ to 113 2″
5.	COAL (Checkered),	2 10″ to 116′ 0″	2′ 10″ to 116′ 0″
6.	Soft SS.,	12′ 0″ to 128′ 0″	12 0″ to 128′ 0″
7.	Black slate,	7′ 0″ to 135′ 0″	7′ 0″ to 135′ 0″
8.	Soft SS.,	6′ 0″ to 141′ 0″	6′ 0″ to 141′ 0″
9.	Black slate,	4′ 10″ to 145′ 10″	4′ 10″ to 145′ 10″
10.	Hard SS.,	51′ 0″ to 196′ 10″	51′ 0″ to 196′ 10″
11.	Soft SS.,	6′ 6″ to 203′ 4″	6′ 6″ to 203′ 4″
12.	Black slate,	1′ 6″ to 204′ 10″	1′ 6″ to 204′ 10″
13.	Bone,	3″ to 205′ 1″	6′ 3″ to 205′ 1″
14.	Black slate,	4 3″ to 209′ 4″	4′ 3″ to 209′ 4″
15.	COAL,	9″ to 210′ 1″	9″ to 210′ 1″
16.	Black slate,	7′ 0″ to 217′ 1″	7′ 0″ to 217′ 1″
17.	Fire clay,	1′ 2″ to 218′ 3″	1′ 2″ to 218′ 3″
18.	KIDNEY BED,	4′ 5″ to 222′ 8″	4′ 5″ to 222′ 8″
19.	Hard SS.,	61′ 8″ to 284′ 4″	61′ 8″ to 284′ 4″
20.	HILLMAN BED,	12′ 9½″ to 297′ 1½″	12′ 9½″ to 297′ 1½″

See Columnar Section Sheet No. II and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Hillman Vein shaft near Wilkes Barre, from surface to Hillman bed.

Hillman Vein Coal Co.

(Measured by Geological Survey.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Cribbing,	40′ 5′ to 40′ 5″	40′ 5″ to 40′ 5″
2.	SS. Dip 23° S.,	18′ 10″ to 59′ 3″	17′ 4″ to 57′ 9″
3.	Slate,	13′ 3″ to 72′ 6″	12′ 2″ to 69′ 11″
4.	COAL,	6″ to 73′ 0″	6″ to 70′ 5″
5.	Slate,	2′ 9″ to 75′ 9″	2′ 6″ to 72′ 11′
6.	HILLMAN BED,	8 8′ to 84′ 5″	8′ 8″ to 81′ 7″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
7.	Hard sandstone, . .	41' 0'' to 125' 5''	37' 9'' to 119' 4''
8.	Slate, ...	4' 6'' to 130' 0''	4' 1'' to 123' 5''
9.	Sandstone, ...	13' 0' to 143' 0''	12' 0'' to 135' 5''
10.	Slate and bone, . .	6' 0'' to 149' 0'	5' 6'' to 140' 11''
11.	Sandstone, hard, . .	120' 0'' to 269' 0''	110' 5' to 251' 4''
12.	Slate and bone, . .	10' 5'' to 279 4''	9' 7'' to 260' 11''
13.	COAL BED, ...	4' 0'' to 283' 4''	4 0' to 264' 11''

See Columnar Section Sheet No. II and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Kidder Diamond Drill bore-hole from surface to Baltimore bed.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	49' 3'' to 49' 3''	49' 3'' to 49 3''
2.	SS. Dip. 10¾° N., .	167' 1'' to 216' 4''	164' 1'' to 213 4''
3.	Slate, ...	8' 0'' to 224' 4''	7' 10'' to 221' 2''
4.	COAL and dirt, . .	13' 0'' to 237' 4'	12' 7'' to 233' 9''
5.	Slate, ...	46' 0'' to 283 4''	45' 2'' to 278' 11''
6.	Gray sandstone, . .	33' 8'' to 317' 0''	33' 1'' to 312' 0''
7.	Mica sandstone, . .	10' 8'' to 327' 8'	10 6'' to 322' 6'
8.	Blue sandstone, . .	9' 4'' to 337' 0''	9' 2'' to 331' 8''
9.	Gray sandstone, . .	17' 0'' to 354' 0''	16' 8'' to 348' 4''
10.	BALTIMORE BED, .	15' 0'' to 369' 0''	14' 8' to 363' 0''

See Columnar Sheet No. II and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Grant Street Rope Drill bore-hole, from surface to Baltimore bed.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	56' 6'' to 56' 6''	56' 6'' to 56' 6''
2.	Soft sandstone, . .	11' 4'' to 67' 10''	11' 4'' to 67 10''
3.	Blue slate, ...	3' 7'' to 71' 5''	3' 7'' to 71' 5''
4.	COAL, ...	1' 9'' to 73' 2''	1' 9'' to 73' 2''
5.	Dark sandstone, .	8' 10'' to 82' 0''	8' 10'' to 82' 0''
6.	Fire clay, ...	5' 0'' to 87' 0''	5' 0'' to 87' 0''
7.	Sandstone, ...	7' 0'' to 94' 0''	7' 0'' to 94' 0'

No. of Strata.	*Description.*		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
8.	Fire clay, ...		15′ 0″ to 109′ 0′	15′ 0″ to 109 0″
9.	Sandstone, ...		11′ 0″ to 120′ 0″	11 0″ to 120′ 0″
10.	Fire clay, ...		3′ 0″ to 123′ 0″	3′ 0′ to 123′ 0″
11.	Dark sandstone, .		4′ 0″ to 127′ 0″	4′ 0″ to 127′ 0″
12.	Hard sandstone, .		66′ 2″ to 193′ 2″	66′ 2″ to 193′ 2″
13.	SEVEN-FOOT BED, .		7′ 11″ to 201′ 1″	7′ 11″ to 201′ 1″
14.	Slate, ...		5′ 11″ to 207′ 0″	5′ 11″ to 207′ 0″
15.	Soft sandstone, . .		27′ 0″ to 234′ 0″	27′ 0″ to 234′ 0″
16.	Hard sandstone, .		44′ 0″ to 278′ 0″	44′ 0″ to 278′ 0″
17.	Black slate, . . .		2 1″ to 280′ 1″	2′ 1″ to 280′ 1″
18.	COAL, ...		4′ 7″ to 284′ 8″	4′ 7″ to 284′ 8″
19.	Slate, ...		4″ to 285′ 0″	4″ to 285′ 0″
20.	Fire clay, ...		20′ 0″ to 305′ 0″	20′ 0″ to 305′ 0″
21.	Soft sandstone, . .		38′ 0″ to 343 0″	38′ 0″ to 343′ 0″
22.	Slate and COAL . .		8′ 0″ to 351′ 0″	8′ 0″ to 351′ 0″
23.	Soft sandstone, .		9′ 0″ to 360′ 0″	9′ 0′ to 360′ 0″
24.	KIDNEY BED, . .		8′ 8″ to 368′ 8″	8′ 8″ to 368′ 8″
25.	Black sandstone, .		40′ 3″ to 408′ 11″	40′ 3″ to 408′ 11″
26.	Hard sandstone, .		17′ 2″ to 426′ 1″	17′ 2″ to 426′ 1″
27.	COAL and slate, .		10″ to 426′ 11″	10″ to 426 11″
28.	Soft sandstone, . .		15 3″ to 442 2″	15′ 3″ to 442′ 2″
29.	HILLMAN BED, . .		11′ 3″ to 453′ 5″	11′ 3″ to 453′ 5″
30.	Fire clay, ...		5′ 0″ to 458′ 5″	5′ 0″ to 458′ 5″
31.	Sandstone, ...		21′ 6″ to 479′ 11″	21′ 6″ to 479′ 11″
32.	COAL and slate, .		1′ 6″ to 481′ 5″	1′ 6″ to 481′ 5″
33.	Blue slate, ...		3′ 6″ to 484′ 11″	3′ 6″ to 484′ 11″
34.	Hard sandstone, . .		7 0″ to 491′ 11″	7′ 0″ to 491′ 11″
35.	Gray sandstone, .		21′ 0″ to 512′ 11″	21′ 0″ to 512′ 11″
36.	Slate, ...		12′ 0″ to 524′ 11″	12′ 0″ to 524′ 11′
37.	COAL, ...		3′ 6″ to 528′ 5″	3′ 6″ to 528′ 5″
38.	Slate, ...		6″ to 528′ 11″	6″ to 528′ 11″
39.	Fire clay, ...		9′ 0″ to 537′ 11″	9′ 0″ to 537′ 11″
40.	Sandstone, ...		85′ 0″ to 622′ 11″	85′ 0″ to 622′ 11″
41.	Fire clay, ...		11′ 8″ to 634′ 7″	11′ 8″ to 634′ 7″
42.	COAL BED, ...		10′ 2″ to 644′ 9″	10 2″ to 644′ 9″
43.	Fire clay, ...		6′ 2″ to 650′ 11″	6′ 2″ to 650″ 11″
44.	Sandstone, ...		17′ 0′ to 667′ 11″	17′ 0″ to 667′ 11″
45.	Hard sandstone, .		51′ 0″ to 718′ 11″	51′ 6″ to 718′ 11″
46.	Soft sandstone, . .		5′ 3″ to 724′ 2″	5′ 3″ to 724′ 2″
47.	Slate, ...		′ 4″ to 724′ 6″	4″ to 724′ 6″
48.	COAL, ...	BALTIMORE BED IN DIRT FAULT.	8″ to 725′ 2′	8″ to 725′ 2″
49.	Soft blue clay,		15′ 0″ to 740′ 2″	15 0″ to 740′ 2″
50.	COAL, . . .		1′ 4″ to 741 6″	1′ 4′ to 741′ 6′
51.	Slate, ...		4″ to 741′ 10″	4″ to 741′ 10″
52.	Fire clay, ...		7′ 9″ to 749′ 7″	7′ 9″ to 749′ 7″

See Columnar Section Sheet No. II and Mine Sheet No. VIII, Atlas Northern Anthracite Field, Part I.

Section of Inside tunnel from Baltimore bed to Red Ash bed, Ashley No. 6 Colliery.

L. & W B. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	BALTIMORE BED, . . .	20' 0'' to 20' 0''	15' 11'' to 15' 11''
2.	Slate. Dip 38° N., . .	3' 6'' to 23' 6''	2' 2'' to 18' 1''
3.	Sandstone, ...	111' 6'' to 135' 0''	57' 6'' to 75' 7''
4.	COAL. Dip 25° N., . .	3' 0'' to 138' 0''	1' 3'' to 76' 10''
5.	Slate, ...	7' 0'' to 145' 0''	3' 0'' to 79' 10''
6.	Soft sandstone, ...	10' 0'' to 155' 0''	4' 0'' to 83' 10''
7.	Fire clay, ...	2' 0'' to 157' 0''	1' 0'' to 84' 10''
8.	Soft sandstone, ...	13' 0'' to 170' 0''	5' 6' to 90' 4''
9.	Hard SS. Dip 22° N., .	47' 0' to 217' 0''	17' 6'' to 107' 10''
10.	Fire clay, ...	63' 6'' to 280' 6''	23' 0' to 130' 10''
11.	Slate. Dip 12° N., . .	11' 6'' to 292' 0''	4' 0' to 134' 10''
12.	Sandstone, ...	23' 0'' to 315' 0''	8' 0'' to 142' 10''
13.	Slate, ...	14' 0'' to 329' 0''	2' 0'' to 144' 10''
14.	ROSS BED. Dip 20° N.,	60' 6'' to 389' 6''	24' 9'' to 169' 7''
15.	Slate, ...	11' 7'' to 401' 1''	4' 0'' to 173' 7''
16.	COAL, ...	4' 5'' to 405' 6''	1' 9'' to 175' 4''
17.	Sandstone, ...	157' 0' to 562' 6''	83' 0'' to 258' 4''
18.	COAL. Dip 24° N., . .	5' 8'' to 568' 2''	3' 9'' to 262' 1''
19.	Fire clay, ...	17' 0'' to 701' 6''	7' 3'' to 269' 4''
20.	Sandstone, ...	45' 0'' to 746' 6''	19' 0'' to 288' 4''
21.	COAL, ...	1' 0'' to 747' 6''	6'' to 288' 10''
22.	Fine conglomerate, . .	31' 0'' to 778' 6''	12' 9'' to 301' 7''
23.	Slate and fire clay, . .	4' 0'' to 782' 6''	2' 0'' to 303' 7''
24.	RED ASH BED, ...	33' 0' to 815' 6''	13' 7'' to 317' 2''
25.	Slate and conglomerate,	2' 6'' to 818' 0''	1' 3'' to 318' 5''

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Section of Empire shaft No. 2 from surface to Red Ash bed.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	7' 0'' to 7' 0''	7' 0'' to 7' 0''
2.	Black SS. Dip 12° N.,	13' 2'' to 20' 2''	12' 11'' to 19' 11''
3.	Slate, ...	1' 6'' to 21' 8''	1' 6'' to 21' 5''
4.	Black sandstone, . . .	77' 0'' to 98' 8''	75' 4'' to 96' 9''

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
5.	Slate, ...	5″ to 99′ 1″	5″ to 97′ 2″
6.	Coal bed, ...	5′ 5′ to 104′ 6″	5′ 4″ to 102′ 6″
7.	Sandstone, ...	26′ 10″ to 131′ 4″	26′ 3″ to 128′ 9″
8.	Coal bed, ...	3′ 2′′ to 134′ 6′′	3′ 1″ to 131′ 10″
9.	Slate.	2′ 0′′ to 136′ 6″	1′ 11″ to 133′ 9″
10.	Hard sandstone, . . .	86′ 0″ to 222′ 6″	84′ 1″ to 217′ 10″
11.	Black slate and fire clay, ...	6′ 0″ to 228′ 6″	5′ 10″ to 223′ 8″
12.	Ross bed, ...	9′ 2′ to 237′ 8″	8′ 10″ to 232′ 6″
13.	Hard SS. and cong., .	65′ 5″ to 303′ 1″	64′ 1″ to 296′ 7″
14.	Black slate, ...	1′ 5″ to 304′ 6 ′	1′ 5″ to 298′ 0″
15.	Red ash bed (top split), ...	6′ 10″ to 311′ 4″	6′ 9″ to 304· 9″
16.	Soft sandstone, ...	35′ 3″ to 346′ 4″	34′ 3″ to 339′ 0″
17.	Red ash bed (bottom split), ...	12′ 8″ to 359′ 0″	12′ 4″ to 351′ 4″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Section of Stanton Rope Drill bore-hole from surface through the Baltimore bed to sandstone at 680 feet.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	71′ 6″ to 71′ 6″	71′ 6″ to 71′ 6
2.	Coal bed,. . . .	5′ 6″ to 77′ 0″	5′ 6″ to 77′ 0″
3.	Soft sandstone, .	166′ 0″ to 243′ 0″	166′ 0″ to 243′ 0 ′
4.	Kidney bed, . .	3′ 0″ to 246′ 0″	3′ 0″ to 246′ 0″
5.	Sandstone, . . .	58′ 0″ to 304′ 0″	58′ 0″ to 304′ 0″
6.	Hillman bed, .	5′ 0″ to 309′ 0″	5′ 0″ to 309 0″
7.	Soft sandstone, .	52′ 0″ to 361′ 0″	52′ 0″ to 361 0″
8.	Lodgment bed,.	7′ 0″ to 368′ 0″	7′ 0 ′ to 368′ 0″
9.	Soft sandstone, .	112′ 0″ to 480′ 0″	112′ 0 ′ to 480′ 0″
10.	Coal, ...	10″ to 480′ 10″	10″ to 480′ 10 ′
11.	Slate, ...	2″ to 481′ 0″	2″ to 481′ 0 ′
12.	Sandstone, . . .	104′ 0″ to 585′ 0″	104′ 0″ to 585′ 0′
13.	Coal and slate, .	7 0″ to 592′ 0″	7′ 0″ to 592′ 0″
14.	Sandstone, . . .	40′ 0″ to 632′ 0″	40′ 0″ to 632′ 0″
15.	Slate, ...	26′ 0″ to 658′ 0″	26 0″ to 658′ 0″
16.	Baltimore bed,	16′ 8″ to 674′ 8′	16′ 8″ to 674 8″
17.	Slate, ...	2′ 4″ to 677 0″	2′ 4″ to 677′ 0″
18.	Sandstone, . . .	3′ 0″ to 680′ 0″	3′ 0″ to 680. 0″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Section of Stanton air shaft from surface to Baltimore bed.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Strata, ...	27′ 0′ to 27′ 0″	27′ 0″ to 27′ 0″
2.	COAL, ...	1′ 0′ to 28′ 0″	1′ 0′ to 28′ 0″
3.	Strata, ...	64′ 0″ to 92′ 0′	64′ 0′ to 92′ 0″
4.	COAL, ...	1′ 6″ to 93′ 6″	1′ 6″ to 93 6′
5.	Strata, ...	180 6″ to 274′ 0″	180 6″ to 274′ 0″
6.	COAL BED, . . .	10′ 0″ to 284′ 0′	10′ 0″ to 284′ 0″
7.	Strata, ...	70′ 0″ to 354′ 0″	70′ 0′ to 354′ 0″
8.	SEVEN-FOOT BED,	5′ 11″ to 359′ 11″	5′ 11″ to 359′ 11″
9.	Strata, ...	62′ 1″ to 422′ 0″	62′ 1″ to 422′ 0″
10.	COAL BED, . . .	2′ 0″ to 424′ 0″	2′ 0″ to 424′ 0″
11.	Strata, ...	30′ 0″ to 454′ 0″	30′ 0″ to 454′ 0″
12.	KIDNEY BED, . .	5′ 0″ to 459′ 0″	5′ 0″ to 459′ 0″
13.	Strata, ...	57′ 0″ to 516′ 0″	57′ 0″ to 516′ 0″
14.	HILLMAN BED, .	9′ 0″ to 525′ 0″	9′ 0″ to 525′ 0″
15.	Strata, ...	86′ 0″ to 611′ 0″	86′ 0′ to 611′ 0″
16.	COAL BED, . . .	6′ 0″ to 617′ 0″	6′ 0″ to 617′ 0″
17.	Strata, ...	29′ 0″ to 646′ 0″	29′ 0″ to 646′ 0″
18.	COAL BED, . . .	6′ 0″ to 652′ 0″	6′ 0″ to 652′ 0′
19.	Strata, ...	93′ 0″ to 745′ 0″	93′ 0″ to 745′ 0″
20.	COAL BED, . . .	5′ 0″ to 750′ 0′	5′ 0″ to 750′ 0″
21.	Strata, ...	55′ 0″ to 805′ 0″	55′ 0″ to 805′ 0″
22.	BALTIMORE BED,	22′ 0″ to 827′ 0″	22′ 0″ to 827′ 0″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Section of South WilkesBarre shaft from surface to Hillman bed.

L. & W B. C. Co.

(Measured by Geological Survey).

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Cribbing, ...	44′ 0″ to 44′ 0″	44′ 0″ to 44′ 0″
2.	Hard SS. Dip 8° S.,	28′ 0″ to 72′ 0″	27′ 8″ to 71′ 8″
3.	Slate, ...	11′ 0″ to 83′ 0″	10′ 11″ to 82′ 7″
4.	COAL, ...	2′ 5″ to 85′ 5″	2′ 5″ to 85′ 0″
5.	Hard slate, ...	12′ 7″ to 98′ 0″	12′ 5″ to 97′ 5″
6.	Soft sandstone, . . .	6′ 3″ to 104 3″	6′ 3″ to 103′ 8″
7.	COAL, ...	6″ to 104′ 9″	6″ to 104 2′

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
8.	Hard sandstone, . .	45′ 3″ to 150′ 0″	44′ 9′ to 148′ 11″
9.	COAL, ...	1′ 0″ to 151′ 0″	1′ 0″ to 149′ 11″
10.	Slate.	3′ 6″ to 154′ 6″	3′ 6″ to 153′ 5″
11.	COAL, ...	1′ 6″ to 156′ 0″	1′ 6″ to 154′ 11″
12.	Slate, ...	14′ 0″ to 170′ 0″	13′ 10″ to 168′ 9″
13.	Micaceous sandstone,	31′ 0″ to 201′ 0″	30′ 8″ to 199′ 5″
14.	Hard slate.	4′ 0″ to 205′ 0″	4′ 0″ to 203′ 5″
15.	Soft sandstone, . . .	29′ 0″ to 234′ 0″	28′ 8″ to 232′ 1″
16.	Fire clay, ...	10′ 0″ to 244′ 0″	9′ 11″ to 242′ 0″
17.	Hard sandstone, . .	40′ 0″ to 284′ 0″	39′ 8″ to 281′ 8″
18.	Slate and fire clay, .	7′ 0″ to 291′ 0″	6′ 11″ to 288′ 7″
19.	Slate, ...	29′ 0″ to 320′ 0″	28′ 8″ to 317′ 3″
20.	COAL, ...	6″ to 320′ 6″	6″ to 317′ 9″
21.	Hard slate, ...	24′ 6″ to 345′ 0″	24′ 3″ to 342′ 0″
22.	Hard sandstone, . .	58′ 0″ to 403′ 0″	57′ 6″ to 399′ 6″
23.	Slate, ...	2′ 0″ to 405′ 0″	2′ 0″ to 401′ 6″
24.	SEVEN-FOOT (OR LODGMENT BED), .	5′ 3″ to 410′ 3″	5′ 2″ to 406′ 8″
25.	Fire clay. Dip 8°, S.,	5′ 0″ to 415′ 3″	4′ 11″ to 411′ 7″
26.	Sandstone, ...	73′ 8″ to 488′ 11″	72′ 11″ to 484′ 6″
27.	Slate, ...	2′ 7″ to 491′ 6″	2′ 7″ to 487′ 1″
28.	COAL (BONY), . . .	2′ 0″ to 493′ 6″	2′ 0″ to 489′ 1″
29.	Sandstone, ...	39′ 1″ to 532′ 7″	38′ 8″ to 527′ 9″
30.	Fire clay, ...	1′ 0″ to 533′ 7″	1′ 0″ to 528′ 9″
31.	KIDNEY BED, ...	5′ 9′ to 539′ 4″	5′ 8″ to 534′ 5″
32.	Hard fire clay, . . .	11′ 11″ to 551′ 3″	8′ 0″ to 542′ 5″
33.	SS. and fire clay, . .	67′ 0″ to 618′ 3″	59′ 0″ to 601′ 5″
34.	Slate and fire clay, .	42′ 0″ to 660′ 3″	41′ 11″ to 643′ 4″
35.	HILLMAN BED, . . .	14′ 8″ to 674′ 11″	14′ 7″ to 657′ 11″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Section of No. 3 Inside tunnel, No. 9 shaft, Sugar Notch.

L. & W B. C. Co.

(Measured by Geological Survey).

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	ROSS BED.		
2.	Slate, ...	33′ 0″ to 33′ 0″	14′ 5″ to 14′ 5″
3.	Hard sandstone, . .	63′ 0″ to 96′ 0″	27′ 6″ to 41′ 11″
4.	Slate, ...	2′ 0″ to 98′ 0″	8″ to 42′ 7″
5.	Hard sandstone, . .	98′ 0″ to 196′ 0″	42′ 9″ to 85′ 4″
6.	COAL BED. Dip 26° N., ...	28′ 0″ to 224′ 0″	12′ 3″ to 97′ 7″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
7.	Hard sandstone, . .	124′ 0″ to 348′ 0″	60′ 0″ to 157′ 7″
8.	**RED ASH BED**, ...		8′ 8″ to 166′ 3″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

NOTE.—The measurements for this section began at No. 2 and stopped at No. 7. No. 8 was, however, measured perpendicular to dip.

Section of Franklin Upper tunnel from Baltimore bed to Red Ash bed.

Franklin Coal Co.

(Reported by I. A. Stearns, M. E.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**BALTIMORE BED.**		
2.	Hard sandstone, . .	220′ 0″ to 220′ 0″	116′ 6″ to 116′ 6″
3.	Slate, ...	50′ 0″ to 270′ 0″	138′ 6″ to 155′ 0″
4.	Hard sandstone, . .	8′ 0″ to 278′ 0″	7′ 0″ to 162′ 0″
5.	**COAL BED**.	3′ 6″ to 281′ 0″	2′ 4″ to 164′ 4″
6.	Hard sandstone, . .	5′ 0″ to 286′ 6″	2′ 3″ to 166′ 7″
7.	**COAL**, ...	2′ 6″ to 289′ 0″	1′ 0″ to 167′ 7″
8.	Sandstone, ...	4′ 0″ to 293′ 0″	1′ 8″ to 169′ 3″
9.	**COAL (BONY)**, . . .	2′ 0″ to 295′ 0″	1′ 0″ to 170′ 3′
10.	Soft sandstone, . .	43′ 0″ to 338′ 0″	17′ 0″ to 187′ 3″
11.	Hard sandstone, . .	10′ 0″ to 348′ 0″	7′ 0″ to 194′ 3″
12.	Fire clay, ...	3′ 0″ to 351′ 0″	2′ 0″ to 196′ 3″
13.	**COAL BED**, ...	12′ 0″ to 363 0′	7′ 3″ to 203′ 6″
14.	Fire clay, ...	6′ 6″ to 369 6″	10′ 0″ to 213′ 6″
15.	**COAL BED**, . .	14′ 6″ to 384′ 0″	7′ 9″ to 221′ 3′
16.	Soft sandstone, . .	37′ 0″ to 421′ 0″	19′ 6″ to 240′ 9″
17.	Hard sandstone, . .	21′ 0″ to 442′ 0″	11′ 0″ to 251′ 9″
18.	Very hard SS., . .	3′ 7″ to 445′ 7″	2′ 6′ to 254′ 3″
19.	Sandstone, ...	47′ 10″ to 493′ 5″	35′ 6″ to 289′ 9″
20.	**COAL BED**, ...	29′ to 522′ 5″	12′ 6″ to 302′ 3″
21.	Fire clay, ...	6′ 7″ to 529′ 0′	4′ 2″ to 306′ 5″
22.	**COAL BED**, ...	10′ to 539′ 0″	5′ 9″ to 312′ 2″
23.	Fire clay, ...	6′ 6″ to 545′ 6″	4′ 0″ to 316′ 2″
24.	**COAL BED**, ...	27′ to 572′ 6″	15′ 5″ to 331′ 7″
25.	Sandstone, ...	142′ to 714′ 6″	87′ 0″ to 418′ 7″
26.	**RED ASH BED (TOP SPLIT)**, ...	12′ to 726′ 6″	6′ 11″ to 425′ 6″
27.	Slate, ...	7′ to 733′ 6′	4′ 6″ to 430′ 0″
28.	**RED ASH BED (BOTTOM SPLIT)**, .	16′ 6″ to 750′ 0″	11′ 2″ to 441′ 2″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Section of Franklin lower tunnel from slate and sandstone (confused) next below Baltimore bed to Red Ash bed.

Franklin Coal Co.

(Measured by Geological Survey).

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thickness perpendicular to dip.*
1.	Slate and SS. Dip confused.		
2.	Sandstone, ...	189′ 9″ to 189′ 9″	39′ 9″ to 39′ 9″
3.	COAL, ...	28′ 3″ to 218′ 0′	2′ 6′ to 42′ 3″
4.	Sandstone, ...	68′ 0″ to 286′ 0″	36′ 0″ to 78′ 3″
5.	COAL, ...	33′ 0″ to 319′ 0″	5′ 0″ to 83′ 3″
6.	Slate, ...	7′ 0″ to 326′ 0″	3′ 0″ to 86′ 3″
7.	Hard sandstone, .	29′ 6″ to 355′ 6″	20′ 0″ to 106′ 3″
8.	COAL BED. Dip 28° N., ...	41′ 0″ to 396′ 6″	5′ 0″ to 111 3″
9.	Fire clay, ...	11′ 6″ to 408′ 0″	14′ 0″ to 125′ 3′
10.	COAL dirt and slate. Dip 12° N.,	34′ 0″ to 442′ 0″	5′ 0″ to 130′ 3″
11.	Fire clay, ...	5′ 0″ to 447′ 0″	3′ 0″ to 133′ 3″
12.	Sandstone, ...	299′ 11″ to 746′ 11″	138′ 0″ to 271′ 3″
13.	Dirt. N. dip confused, ...	3′ 3″ to 750′ 2″	2′ 0″ to 273′ 3′
14.	COAL, ...	4′ 10″ to 755′ 0″	3′ 0″ to 276′ 3″
15.	SS. Dip 38° N., .	92′ 4″ to 847′ 4″	64′ 0″ to 340′ 3″
16.	Slaty SS. Dip 49° N., ...	5′ 0″ to 852′ 4″	3′ 6″ to 343′ 9″
17.	Sandstone, ...	62′ 8″ to 915′ 0″	48′ 0″ to 391′ 9″
18.	RED ASH BED (TOP SPLIT), ...		8′ 10″ to 400′ 7″
19.	Fire clay.		5′ 0″ to 405′ 7″
20.	RED ASH BED (BOTTOM SPLIT), . . .		15′ 1″ to 420′ 8″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

NOTE.—No. 2 begins the connected section. Nos. 18, 19 and 20 were measured perpendicular to the dip alone.

Section of Jersey tunnel Sugar Notch colliery No. 9 from surface to Ross bed.

L. & W B. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Sandstone, ...	80′ 0″ to 80′ 0″	22′ 0″ to 22′ 0″
2.	COAL BED, ...	32′ 0″ to 112′ 0″	8′ 8″ to 30′ 8″
3.	Fire clay, ...	31′ 0″ to 143′ 0″	8′ 5″ to 39′ 1″
4.	COAL BED, ...	36′ 0″ to 179′ 0′	11′ 7″ to 50′ 8″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
5.	Slate, ...	10' 6" to 189' 6"	3' 9" to 54' 5"
6.	COAL BED, ...	1' 0" to 190' 6"	6" to 54' 11"
7.	Slate, ...	65' 6" to 256' 0"	24' 6" to 79' 5"
8.	COAL BED. Dip 22° N., ...	20' 0" to 276' 0"	7' 6' to 86' 11"
9.	Slate and fire clay with iron balls,, .	26' 0" to 302' 0"	14' 5" to 101' 4"
10.	Sandstone, ...	48' 0" to 350' 0"	26' 8" to 128' 0"
11.	Slate, ...	10' 0" to 360' 0"	5' 6" to 133' 6"
12.	Sandstone, ...	10' 6" to 370' 6"	5' 8" to 139' 2"
13.	Slate. Dip 34° N., .	3' 6" to 374' 0"	1' 8" to 140' 10"
14.	Hard sandstone, . .	18' 0" to 392' 0"	8' 4" to 149' 2"
15.	Fire clay. Dip 28° N., ...	19' 0" to 411' 0"	8' 9" to 157' 11"
*16.	ROSS BED, ...		8' 1" to 166' 0"

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

*No. 16 was measured perpendicular to dip only.

Section of Mountain tunnel from surface to Red Ash bed. Franklin Coal Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Slate and bone,	ROSS BED.	. . . .	2' 4' to 2' 4"
2.	COAL, ...		. . . .	2' 2' to 4' 6"
3.	Hard slate, . . .		. . . .	2' 11" to 7' 5"
4.	COAL BED, . . .		. . . .	12' 6" to 19' 11"
5.	Slate, ...		. . . .	6' 2" to 26' 1"
6.	COAL BED, . . .		. . . .	7' 4" to 33' 5"
7.	Slate, ...		. . . .	5' 8" to 39' 1"
8.	COAL BED, . . .		. . . .	17' 2" to 56' 3"
9.	Slate, ...		13' 0" to 13' 0"	6' 11" to 63' 2"
10.	Hard sandstone, . .		52' 0" to 65' 0"	27' 0" to 90' 2"
11.	Slate and dirt, . . .		1' 0" to 66' 0"	6" to 90' 8'
12.	Hard sandstone at 111'. Dip 32° N.,		95' 0" to 161' 0"	50' 4" to 141' 0"
13.	COAL BED, . . .	RED ASH BED.	. . . .	12' 4" to 153' 4"
14.	Fire clay, . . .		. . . .	1' 6" to 154' 10"
15.	Slate and bone,		. . . .	1' 8" to 156' 6"
16.	COAL BED, . . .		. . . .	9' 0" to 165' 6"

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

Nos. 1 to 8 and 13 to 16 were measured perpendicular to dip only.

Section of Sugar Notch shaft No. 9 from surface to Coal bed, at 299′ 3″.

L. & W B. C. Co.

(Reported by L. & W B. C. Co.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Cribbing,	42′ 0″ to 42′ 0″	42′ 0″ to 42′ 0″
2.	Gray SS. Dip 18° N.,	24′ 0″ to 66′ 0″	22′ 10″ to 64′ 10″
3.	Slate,	9″ to 66′ 9″	9″ to 65′ 7″
4.	BALTIMORE BED (TOP BENCH),	3′ 10″ to 70′ 7″	3′ 8′ to 69′ 3″
5.	Slate,	5′ 11″ to 76′ 6″	5′ 8″ to 74′ 11″
6.	Sandstone,	29′ 6″ to 106′ 0″	28′ 1″ to 103′ 0″
7.	Slate,	18′ 0″ to 124′ 0″	17′ 1″ to 120′ 1″
8.	BALTIMORE BED (BOTTOM BENCH),	7′ 11″ to 131′ 11″	7′ 6″ to 127′ 7″
9.	Hard sandstone,	36′ 5″ to 168′ 4″	34′ 8″ to 162′ 3″
10.	Granite (sandstone),	2′ 9″ to 171′ 1″	2′ 7″ to 164′ 10′
11.	Hard sandstone,	9′ 8″ to 180′ 9″	9′ 2″ to 174′ 0″
12.	Soft sandstone,	8′ 6″ to 189′ 3″	8′ 1″ to 182′ 1″
13.	Granite (sandstone),	29′ 10″ to 219′ 1″	28′ 4″ to 210′ 5″
14.	Hard sandstone,	5′ 6″ to 224′ 7″	5′ 3″ to 215′ 8″
15.	Slate,	13′ 9″ to 238′ 4″	13′ 1″ to 228′ 9″
16.	COAL,	1′ 0″ to 239′ 4″	11″ to 229′ 8″
17.	Slate,	3′ 5″ to 242′ 9″	3′ 3″ to 232′ 11″
18.	Sandstone,	62′ 9″ to 305′ 6″	59 9″ to 292′ 8″
19.	Slate,	10″ to 306′ 4″	9″ to 293′ 5″
20.	COAL BED,	6′ 1″ to 312′ 5″	5′ 10″ to 299′ 3″

See Columnar Section Sheet No II and Mine Sheet No. 6.

Section of Shaft Level tunnel from Shaft bed to Red Ash bed, No. 9 shaft, Sugar Notch.

L. & W B. C. Co.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	SHAFT BED,		6′ 0″ to 6′ 0″
2.	Slate,	43′ 0″ to 43′ 0″	13′ 3″ to 19′ 3″
3.	COAL BED,	23′ 0″ to 66′ 0″	5′ 10″ to 25′ 1″
4.	Fire clay,	45 0″ to 111′ 0″	13′ 9″ to 38′ 10″
5.	Sandstone,	81′ 0″ to 192′ 0″	25′ 0″ to 63′ 10″
6.	Fire clay,	59′ 0″ to 251′ 0″	18′ 2″ to 82′ 0′

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to the dip.*
7.	ROSS BED. Dip 18°	33' 0'' to 284' 0''	8' 3'' to 90' 3''
8.	Soft sandstone, . . .	13' 0'' to 297' 0''	4' 0'' to 94' 3''
9.	Hard sandstone, . .	473' 0'' to 770' 0''	122' 2'' to 216' 5''
10.	COAL BED. Dip 12° N., ...	12' 0'' to 782' 0''	3' 6'' to 219' 11''
11.	Hard sandy slate, . .	41' 0'' to 823' 0''	9' 9'' to 229' 8''
12.	Hard sandstone, . .	157' 0'' to 980' 0''	38' 0'' to 267' 8''
13.	RED ASH BED. Dip 14° N., ...		11' 9'' to 279' 5''

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

(No. 13 was measured perpendicular to dip only.)

Section of Long tunnel, No. 10 slope, Sugar Notch.

L. & W B. C. Co.

(Measured by Geological Survey).

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	KIDNEY BED. Dip N. 10°, ...		5' 10'' to 5' 10''
2.	Fire clay and iron balls, ...	42' 6'' to 42' 6''	21' 7'' to 27' 5''
3.	Hard sandstone, . .	21' 4'' to 63' 10''	12' 0'' to 39' 5''
4.	Hard fire clay and iron balls, ...	15 2'' to 79' 0''	9' 4'' to 48' 9''
5.	Hard sandstone, . .	11' 0'' to 90' 0''	6' 10'' to 55' 7''
6.	Fire clay and iron balls, ...	27' 6'' to 117' 6''	18' 3'' to 73' 10''
7.	Slate. Dip 44° N., .	8' 6'' to 126' 0''	5' 11'' to 79' 9''
8.	Fire clay and iron balls, ...	33' 0'' to 159' 0''	24' 0'' to 103' 9''
9.	HILLMAN BED, . . .	7' 9'' to 166' 9''	6' 0'' to 109' 9''
10.	Fire clay and iron balls, ...	49' 9'' to 216' 6''	31' 8'' to 141' 5''
11.	Hard sandstone, . .	37' 6'' to 254' 0''	31' 8'' to 173' 1''
12.	Slate, ...	30' 8'' to 284' 8''	25' 5'' to 198' 6''
13.	COAL BED, ...	3' 2'' to 287' 10''	2' 0'' to 200' 6''
14.	Slate, ...	4' 6'' to 292' 4''	3' 10'' to 204' 4''
15.	COAL BED, ...	5' 5'' to 297 9''	4' 5' to 208' 9''
16.	Fire clay, ...	34' 3'' to 332' 0''	28' 5'' to 237' 2''
17.	Sandstone, ...	19' 0'' to 351' 0''	14' 1'' to 251' 3''
18.	Slate, ...	2' 0'' to 353' 0''	1' 6'' to 252' 9''
19.	COAL. Dip 56° N., .	5' 0'' to 358' 0''	4' 2'' to 256' 11''
20.	Slate, ...	39' 0'' to 397' 0''	26' 10'' to 283' 9''
21.	COAL BED, ...	6' 0'' to 403' 0''	5' 3'' to 289' 0''

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to the dip.
22.	Fire clay,	42′ 6″ to 445′ 6″	11′ 7″ to 300′ 7″
23.	Sandstone,	8′ 0″ to 453′ 6″	2′ 2″ to 302′ 9″
24.	Fire clay and slate,	13′ 6″ to 467′ 0″	3′ 7″ to 306′ 4″
25.	Sandstone,	46′ 6″ to 513′ 6″	12′ 8″ to 319′ 0″
26.	Slate,	11′ 6″ to 525′ 0″	3′ 1″ to 322′ 1″
27.	COAL BED,	21′ 2″ to 546′ 2″	7′ 3″ to 329′ 4″
28.	Slate,	17′ 10″ to 564′ 0″	8′ 4″ to 337′ 8″
29.	Sandstone,	12′ 0″ to 576′ 0″	5′ 7″ to 343′ 3″
30.	Slate,	39′ 4″ to 615′ 4″	18′ 5″ to 361′ 8″
31.	COAL BED,	3′ 4″ to 618′ 8″	2′ 9″ to 364′ 5″
32.	Slate,	10′ 3″ to 628′ 11″	4′ 9″ to 369′ 2″
33.	COAL BED,	14′ 9″ to 643′ 8″	6′ 8″ to 375′ 10″
34.	Fire clay,	10′ 4″ to 654′ 0″	4′ 9″ to 380′ 7″
35.	COAL BED,	11′ 6″ to 665′ 6″	4′ 1″ to 384′ 8″
36.	Fire clay,	39′ 6″ to 705′ 0″	18′ 6″ to 403′ 2″
37.	Slate,	42′ 0″ to 747′ 0″	19′ 8″ to 422′ 10″
38.	COAL. Dip 28° N.,	15′ 8″ to 762′ 8″	7′ 0″ to 429′ 10″
39.	Slate,	11′ 4″ to 774′ 0″	5′ 4″ to 435′ 2″
40.	Hard sandstone,	50′ 10″ to 824′ 10″	23′ 10″ to 459′ 0″
41.	Fire clay,	7′ 6″ to 832′ 4″	3′ 6″ to 462′ 6″
42.	COAL,	9″ to 833′ 1″	4″ to 462′ 10″
43.	Hard sandstone,	22′ 11″ to 856′ 0″	10′ 8″ to 473′ 6″
44.	ROSS BED.		

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

NOTE.—No. 1 was measured perpendicular to dip only. No. 44 was not measured.

Section of Hanover Coal Company's tunnel, Sugar Notch, from surface to Red Ash bed.

H. C. Co.

(Measured by Geological Survey.)

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	Sandstone,	68′ 7″ to 68′ 7″	67′ 0″ to 67′ 0″
2.	Slate. Dip 80° N.,	4″ to 68′ 11″	4″ to 67′ 4
3.	Sandstone,	9″ to 69′ 8″	6″ to 67′ 10″
4.	Slate,	4″ to 70′ 0″	5″ to 68′ 3″
5.	Hard sandstone,	18′ 5″ to 88′ 5″	16′ 4″ to 84′ 7″
6.	Soft sandstone,	3′ 6″ to 91′ 11″	3′ 2″ to 87′ 9″
7.	Hard sandstone,	35′ 11″ to 127′ 10″	32′ 4″ to 120′ 1″
8.	COAL. Dip 68° N.,	3′ 6″ to 131′ 4″	2′ 3″ to 122′ 4″
9.	SS. Dip 63° N.,	74′ 8″ to 206′ 0″	66′ 2″ to 188′ 6″
10.	RED ASH BED,	16′ 2″ to 222′ 2″	11′ 4½″ to 199′ 10½″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Northern Anthracite Field, Part I.

CHAPTER VI.

Sections in the Eastern Middle Anthracite Coal field.

Section of bore-hole No. 8, about 3800 feet west of slope No. 7, Woodside basin.

No. of strata.	*Description.* Dip 22° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	54′ 6″ to 54′ 6″	50′ 6″ to 50′ 6″
2.	Dark sand rock, . .	17′ 2″ to 71′ 8″	15′ 11″ to 66′ 5″
3.	Coal, ...	2′ 6″ to 74′ 2″	2′ 4″ to 68′ 9″
4.	Slate, ...	3″ to 74′ 5″	3″ to 69′ 0″
5.	Gray sandstone, . .	14′ 6″ to 88′ 11 ′	13′ 5″ to 82′ 5″
6.	Light gray rock, . .	35′ 6″ to 124′ 5″	32′ 11″ to 115′ 4″
7.	Light gray SS., . .	15′ 3″ to 139′ 8″	14′ 2″ to 129′ 6″
8.	Coal, ...	1′ 6″ to 141′ 2″	1′ 5″ to 130′ 11″
9.	Slate, ...	6″ to 141′ 8″	6″ to 131′ 5″
10.	Gray sandstone, . .	9′ 9″ to 151′ 5″	9 0″ to 140′ 5″
11.	Light pebble rock, .	38′ 6″ to 189′ 11″	35′ 8′ to 176′ 1″
12.	Dark pebble rock, .	1′ 10″ to 191′ 9″	1′ 8″ to 177′ 9″

See Columnar Section Sheet No. I and Mine Sheet No.I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No 7, about 100 feet south of mouth of Woodside slope No 4.

Woodside basin.

No. of strata.	*Description.* (Dip 19° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Wash, clay and red shale, ...	34′ 6″ to 34′ 6″	32′ 8″ to 32′ 8″
2.	Red pebble rock,	25′ 6″ to 60′ 0″	24′ 1″ to 56′ 9″
3.	Dark slate, ...	5′ 6″ to 65′ 6″	5′ 2″ to 61′ 11″
4.	Hard, coarse, SS.,	17′ 6″ to 83′ 0″	16′ 7″ to 78′ 6″
5.	Conglomerate, . .	82′ 0″ to 165′ 0″	77′ 7″ to 156′ 1″
6.	Green shale, . . .	14′ 0″ to 179′ 0″	13′ 3″ to 169′ 4″
7.	Conglomerate, . .	67′ 6″ to 246′ 6″	63′ 10″ to 233′ 2″
8.	Green shale, . . .	29′ 6″ to 276′ 0″	27′ 11″ to 261′ 1″
9.	Green sandstone, .	55′ 0″ to 331′ 0″	52′ 0″ to 313′ 1″
10.	Red shale, ...	11′ 0″ to 342′ 0″	10′ 5″ to 323′ 6″
11.	Green shale, sometimes grayish, .	33′ 0″ to 375′ 0 ′	31′ 3″ to 354′ 9″
12.	Red shale, ...	26′ 0″ to 401′ 0″	24′ 7″ to 379′ 4″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Antracite Field, Part I.

Section of bore-hole at Highland colliery, about 200′ south of slope No. 2.

Cross Creek basin.

Estimated position of Buck Mountain coal bed, above top of bore-hole 90 feet.

No. of strata.	*Description.* (Dip about 37° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Red sandstone, . .	90′ 0″ to 90′ 0″	72′ 0″ to 72′ 0″
2.	Conglomerate, . .	76′ 0″ to 166′ 0″	61′ 0″ to 133′ 0″
3.	Green sandstone, .	20′ 0″ to 186′ 0″	16′ 0″ to 149′ 0″
4.	Red shale, ...	14′ 0″ to 200′ 0″	11′ 0″ to 160′ 0″
5.	Green sandstone, .	100′ 0″ to 300′ 0″	80′ 0″ to 240′ 0″
6.	Red shale, ...	26′ 0″ to 326′ 0″	21′ 0″ to 261′ 0″
7.	Sandstone, ...	15′ 0″ to 341′ 0″	12′ 0″ to 273′ 0″
8.	Red shale, ...	12′ 0″ to 353′ 0″	10′ 0″ to 283′ 0″
9.	Green sandstone, .	49′ 0″ to 402′ 0″	39′ 0″ to 322′ 0″
10.	Red sandstone, . .	15′ 0″ to 417′ 0″	12′ 0″ to 334′ 0″
11.	Conglomerate, . .	10′ 0″ to 427′ 0″	8′ 0″ to 342′ 0″
12.	Green sandstone, .	50′ 0″ to 477′ 0″	40′ 0″ to 382′ 0″
13.	Red sandstone, . .	30′ 0″ to 507′ 0″	24′ 0″ to 406′ 0″
14.	Reddish sandstone,	10′ 0″ to 517′ 0″	8′ 0″ to 414′ 0″
15.	Reddish sandstone,	5′ 0″ to 522′ 0″	4′ 0″ to 418′ 0″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 1, at Drifton colliery, about 100′ south of mouth of slope No. 2.

Cross Creek basin.

No. of strata.	*Description.* (Dip 17° 30′ S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Gravel and clay, . .	17′ 0″ to 17′ 0″	16′ 3″ to 16′ 3″
2.	Sand rock, ...	20′ 0″ to 37′ 0″	19′ 1″ to 35′ 4″
3.	Buck Mountain bed,	12′ 0″ to 49′ 0″	11′ 5″ to 46′ 9″
4.	Hard pebble rock, .	36′ 6″ to 85′ 6″	34′ 10″ to 81′ 7″
5.	Slate, ...	2′ 6″ to 88′ 0″	2′ 4″ to 83′ 11″
6.	Hard pebble rock, .	24′ 0″ to 112′ 0″	22′ 11″ to 106′ 10″
7.	Coarse red sandstone,	3′ 0″ to 115′ 0″	2′ 10″ to 109′ 8″
	Quartz (bastard conglomerate), . . .	8′ 0″ to 123′ 0″	7′ 8″ to 117′ 4″
9.	Sandstone, ...	2′ 6″ to 125′ 6″	2′ 4″ to 119′ 8″
10.	Slate, ...	1′ 6″ to 127′ 0″	1′ 5″ to 121′ 1″
11.	Coal, ...	4′ 0″ to 131′ 0″	3′ 10″ to 124′ 11″
12.	Sandstone, ...	4′ 6″ to 135′ 6″	4′ 4″ to 129′ 3″
13.	Conglomerate, . . .	10′ 6″ to 146′ 0″	10′ 0″ to 139′ 3″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 6, at Drifton colliery, at mouth of slope No. 1.

Cross Creek basin.

No. of strata.	*Description.* (Dip 19° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Coal, bottom of Buck Mountain bed, . . .	4′ 0″ to 4′ 0″	3′ 9″ to 3′ 9″
2.	Sandstone, ...	25′ 4″ to 29′ 4″	24′ 0′ to 27′ 9″
3.	Coal, ...	1′ 2″ to 30′ 6″	1′ 1″ to 28′ 10″
4.	Slate, ...	1′ 6″ to 32′ 0″	1′ 5″ to 30′ 3″
5.	Sand rock, ...	9′ 6″ to 41′ 6″	9′ 0″ to 39′ 3″
6.	Black conglomerate, .	16′ 6″ to 58′ 0″	15′ 7″ to 54′ 10″
7.	Sandstone, ...	8′ 6″ to 66′ 6″	8′ 1″ to 62′ 11″
8.	Conglomerate, ...	9 0″ to 75′ 6″	8′ 6″ to 71′ 5″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 5, at Drifton colliery, near south end of Long Rock tunnel from slope No. 2.

Cross Creek basin.

No. of strata.	*Description.* (Dip 5° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	15′ 0″ to 15′ 0″	14′ 11″ to 14′ 11″
2.	Gray slate, ...	12′ 3″ to 27′ 3″	12′ 2″ to 27′ 1″
3.	Soft dark slate, . . .	3″ to 27′ 6″	3″ to 27′ 4″
4.	Wharton coal bed, .	8′ 6″ to 36′ 0″	8′ 6″ to 35′ 10″
5.	Dark bluish slate, .	4′ 0″ to 40′ 0″	4′ 0″ to 39′ 10″
6.	Gray sandstone, . .	35′ 0″ to 75′ 0′	34′ 10″ to 74′ 8″
7.	Dark slate, ...	16′ 0″ to 91′ 0″	15′ 11″ to 90′ 7″
8.	Dark pebble rock, .	24′ 0″ to 115′ 0″	23′ 11″ to 114′ 6″
9.	Gray slate, ...	37′ 0″ to 152′ 0″	36′ 10″ to 151′ 4″
10.	Dark sandstone, . .	17′ 0″ to 169′ 0″	16′ 11″ to 168′ 3″
11.	Bluish slate, ...	10′ 0″ to 179′ 0″	10′ 0″ to 178′ 3″
12.	Dark sandstone, . .	7′ 0″ to 186′ 0′	7′ 0″ to 185′ 3″
13.	Gray sandstone, . .	16′ 0″ to 202′ 0″	15′ 11″ to 201′ 2″
14.	Dark pebble rock, .	7′ 0″ to 209′ 0″	7′ 0″ to 208′ 2″
15.	Dark sandstone, . .	11′ 0″ to 220′ 0″	10′ 11″ to 219′ 1″
16.	Dark pebble rock, .	24′ 5″ to 244 5″	24′ 4″ to 243′ 5″
17.	Buck Mountain coal bed. (Top bench.)		

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 2, at Drifton colliery, about 250′ north of mouth of slope No. 2.

Cross Creek basin.

No. of strata.	*Description.* (Dip 19° 30′ S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	25′ 10″ to 25′ 10″	24′ 4″ to 24′ 4″
2.	Top bench of conglomerate, . . .	133′ 2″ to 159′ 0″	125′ 7″ to 149′ 11″
3.	Green sandstone, .	2′ 0″ to 161′ 0″	1′ 11″ to 151′ 10′
4.	Bottom bench of conglomerate, . .	33′ 0″ to 194′ 0″	31 1″ to 182′ 11″
5.	Green shale, . . .	12′ 0″ to 206′ 0″	11′ 4″ to 194′ 3″
6.	Red shale, ...	12′ 0″ to 218′ 0″	11′ 4″ to 205′ 7″
7.	Green sandstone, .	53′ 0″ to 271′ 0″	50′ 0″ to 255′ 7″
8.	Red shale, ...	7′ 0″ to 278′ 0″	6′ 7″ to 262′ 2″
9.	Green shale, . . .	11′ 0″ to 289′ 0″	10 4″ to 272′ 6″
10.	Red shale, ...	37′ 8″ to 326′ 8″	35′ 6″ to 308′ 0″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 8, at Drifton colliery, 1767′ N. 38° W. from top of slope No. 1, on west side of road.

Cross Creek basin.

No. of strata.	*Description.* (Dip S. 65°)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	30′ 9″ to 30′ 9″	30′ 9″ to 30′ 9″
2.	Coal, ...	8″ to 31′ 5″	3″ to 31′ 0″
3.	Slate, ...	2″ to 31′ 7″	1″ to 31′ 1″
4.	Coal, ...	1′ 8″ to 33′ 3″	8″ to 31′ 9″
5.	Dark slate, ...	5″ to 33′ 8″	2″ to 31′ 11″
6.	Dark sandstone, . . .	4′ 9″ to 38′ 5″	2′ 0″ to 33′ 11″
7.	Dark slate, ...	2′ 8″ to 41′ 1″	11″ to 34′ 10″
8.	Coal, ...	3″ to 41′ 4″	1″ to 34′ 11″
9.	Slate, ...	4′ 6″ to 45′ 10″	1′ 11″ to 36′ 10″
10.	Coal, ...	6′ 6″ to 52′ 4″	2′ 9″ to 39′ 7″
11.	Slate, ...	8″ to 53′ 0″	3″ to 39′ 10″
12.	Coal, ...	7′ 6″ to 60′ 6″	3′ 2″ to 43′ 0″
13.	Slate, ...	8″ to 61′ 2″	2″ to 43′ 2″
14.	Coal, ...	2′ 3″ to 63′ 5″	1′ 0″ to 44′ 2″
15.	Sandstone, ...	52′ 6″ to 115′ 11″	39′ 4″ to 83′ 6″
16.	Coal, ...	6″ to 116′ 5″	6″ to 84′ 0″
17.	Slate, ...	6″ to 116′ 11″	6″ to 84′ 6″
18.	Coal, ...	2′ 8″ to 119′ 7″	2′ 7″ to 87′ 1″
19.	Slate. Dip. 12°, . . .	1′ 2″ to 120′ 9″	1′ 2″ to 88′ 3″
20.	Gray sandstone, . . .	57′ 10″ to 178′ 7″	56′ 8″ to 144′ 11″

No. of strata.	Description. (Dip S. 65°)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
21.	Dark slate, ...	45' 4'' to 223' 11''	44' 5'' to 189' 4''
22.	Sandstone. Dip 10°,	11' 0'' to 234' 11''	10' 9'' to 200' 1''
23.	SS. with pebbles, . .	7' 8'' to 242' 7''	7' 6'' to 207' 7''
24.	Coal, ...	10' 9'' to 253' 4''	10' 6'' to 218' 1''
25.	Slate, ...	1' 7'' to 254' 11''	1' 7'' to 219' 8''
26.	Coal, ...	12' 7'' to 267' 6''	12' 4'' to 232' 0''
27.	Slate, ...	2' 3' to 269' 9''	2' 1'' to 234' 1''
28.	Coal, ...	8' 4'' to 278' 1''	8' 2'' to 242' 3''
29.	Slate, ...	11' 7'' to 289' 8''	11' 4'' to 253' 7''
30.	Coal, ...	1' 0'' to 290' 8''	1' 0'' to 254' 7''
31.	Slate, ...	6'' to 291' 2''	6'' to 255' 1''
32.	Coal, ...	10'' to 292' 0''	10'' to 255' 11''
33.	Slate, ...	1' 1'' to 293' 1''	1' 1'' to 257' 0''
34.	Coal, ...	6' 6'' to 299' 7''	6' 4'' to 263' 4''
35.	Slate, ...	8' 10'' to 308' 5''	8' 8'' to 272' 0''
36.	Gray SS. Dip 10°, . .	64' 9'' to 373' 2''	63' 5'' to 335' 5''
37.	Coal, ...	9'' to 373' 11''	9'' to 336' 2''
38.	Sandstone, ...	23' 0'' to 396' 11''	22' 6'' to 358' 8''
39.	Coal, ...	1' 0'' to 397' 11''	1' 0'' to 359' 8''
40.	Slate, ...	6'' to 398' 5''	6'' to 360' 2''
41.	Coal, ...	11'' to 399' 4''	11'' to 361' 1''
42.	Slate, ...	5' 9'' to 405' 1''	5' 8'' to 366' 9''
43.	Coal, ...	2' 8'' to 407' 9''	2' 7'' to 369' 4''
44.	Slate, ...	8' 10' to 416' 7''	8' 8'' to 378' 0''
45.	Dark rock, ...	9' 7'' to 426' 2''	9' 5'' to 387' 5'
46.	Sandstone, ...	3' 10'' to 430' 0''	3' 9'' to 391' 2

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 4, at Drifton colliery, about 400' south of mouth of slope No. 1.

Cross Creek basin.

No. of strata.	Description. (Dip 6° N.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	10' 0'' to 10' 0''	9' 11'' to 9' 11''
2.	Sandstone, ...	32' 0'' to 42' 0''	31' 10'' to 41' 9''
3.	Top bench of cong.,	52' 0'' to 94' 0''	51' 9'' to 93' 6''
4.	Bottom bench cong.,	107' 0'' to 201' 0''	106' 6'' to 200' 0''
5.	Green shale, . . .	29' 0' to 230' 0''	28' 10'' to 228' 10''
6.	Sandstone, ...	18' 0'' to 248' 0''	17' 11'' to 246' 9''
7.	Red shale, ...	22' 0'' to 270' 0''	21' 11'' to 268' 8''
8.	Green sandstone, .	17' 0'' to 287' 0''	16' 11'' to 285' 7''
9.	Red shale, ...	23' 0'' to 310' 0''	22' 11'' to 308' 6''
10.	Green sandstone, .	54' 0'' to 364' 0''	53' 9'' to 362' 3''
11.	Green sandstone, coarse and hard,	17' 0'' to 381' 0''	16' 11'' to 379' 2''

No. of strata.	*Description.* (Dip 6° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
12.	Hard greenish cong.	31′ 0″ to 412′ 0′	30′ 10″ to 410′ 0″
13.	Green sandstone, .	4′ 6″ to 416′ 6″	4′ 6″ to 414′ 6″
14.	Red shale, ...	13′ 6″ to 430′ 0′	13′ 5″ to 427′ 11″
15.	Greenish shale. . .	14 0″ to 444′ 0′	13′ 11″ to 441′ 10″
16.	Hard greenish SS.,	12′ 0″ to 456′ 0″	11′ 11″ to 453′ 9″
17.	Cong. fine, greenish with quartz pebbles, ...	23′ 0″ to 479′ 0″	22′ 11″ to 476′ 8″
18.	Cong. fine, with larger pebbles, .	9′ 0″ to 488′ 0″	8′ 11″ to 485′ 7″
19.	Strata, ...	7′ 0″ to 495′ 0″	6′ 11″ to 492′ 6″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 1, at Lattimer colliery, about 1000′ south-west of slope No. 1.

Little Black Creek basin.

No. of strata.	*Description.* (Dip 20° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Sand and clay, .	11′ 0″ to 11′ 0″	10′ 4″ to 10′ 4″
2.	Sand and fine pebble rock, . . .	10′ 7″ to 21′ 7″	9′ 11″ to 20′ 3″
3.	Coal, ...	1′ 1″ to 22′ 8″	1′ 0″ to 21′ 3″
4.	Slate, ...	1′ 5″ to 24′ 1″	1′ 4″ to 22′ 7″
5.	Coal, ...	6′ 8″ to 30′ 9″	6′ 3″ to 28′ 10″
6.	Sand rock, . . .	6′ 6″ to 37′ 3″	6′ 1″ to 34′ 11″
7.	Black sand rock,	4′ 10″ to 42′ 1″	4′ 6″ to 39′ 5″
8.	Dark sand rock, .	3′ 8″ to 45′ 9″	3′ 5″ to 42′ 10″
9.	Sandy slate, . . .	5′ 0″ to 50′ 9′	4′ 8″ to 47′ 6″
10.	Blue rock, hard,	15′ 1″ to 65′ 10″	14′ 2″ to 61′ 8″
11.	Coal, ...	1″ to 65′ 11″	1″ to 61′ 9″
12.	Black slate, . . .	4′ 3″ to 70′ 2″	4′ 0″ to 65′ 9″
13.	Coal, ...	2′ 3″ to 72′ 5″	2′ 1″ to 67′ 10″
14.	Black slate with streaks of sulphur, ...	11′ 6″ to 83′ 11″	10′ 10″ to 78′ 8″
15.	Black slate, . . .	7′ 5½″ to 88′ 4½″	4′ 2″ to 82′ 10″
16.	Coal, ...	7½″ to 89′ 0″	7″ to 83′ 5″
17.	Black slate, . . .	1′ 0″ to 90′ 0″	11″ to 84′ 4″
18.	Pebble rock, hard,	18′ 1½″ to 108′ 1½″	17′ 1″ to 101′ 5″
19.	Blue rock with fine pebbles, .	10′ 4″ to 118′ 5½″	9′ 9″ to 111′ 2″
20.	Black slate, . . .	1′ 3½″ to 119′ 9″	1′ 3″ to 112′ 5″
21.	Blue rock with pebbles, . . .	17′ 9′ to 137′ 6″	16′ 8″ to 129′ 1″

No. of strata.	*Description.* (Dip S. 65°)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
21.	Dark slate, ...	45' 4'' to 223' 11''	44' 5'' to 189' 4''
22.	Sandstone. Dip 10°,	11' 0'' to 234' 11''	10' 9'' to 200' 1''
23.	SS. with pebbles, . .	7' 8'' to 242' 7''	7' 6'' to 207' 7''
24.	Coal, ...	10' 9'' to 253' 4''	10' 6'' to 218' 1''
25.	Slate, ...	1' 7'' to 254' 11''	1' 7'' to 219' 8''
26.	Coal, ...	12' 7'' to 267' 6''	12' 4'' to 232' 0''
27.	Slate, ...	2' 3' to 269' 9''	2' 1'' to 234' 1''
28.	Coal, ...	8' 4'' to 278' 1''	8' 2'' to 242' 3''
29.	Slate, ...	11' 7'' to 289' 8''	11' 4'' to 253' 7''
30.	Coal, ...	1' 0'' to 290' 8''	1' 0'' to 254' 7''
31.	Slate, ...	6'' to 291' 2''	6'' to 255' 1''
32.	Coal, ...	10'' to 292' 0''	10'' to 255' 11''
33.	Slate, ...	1' 1'' to 293' 1''	1' 1'' to 257' 0''
34.	Coal, ...	6' 6'' to 299' 7''	6' 4'' to 263' 4''
35.	Slate, ...	8' 10'' to 308' 5''	8' 8'' to 272' 0''
36.	Gray SS. Dip 10°, . .	64' 9'' to 373' 2''	63' 5'' to 335' 5''
37.	Coal, ...	9'' to 373' 11''	9'' to 336' 2''
38.	Sandstone, ...	23' 0'' to 396' 11''	22' 6'' to 358' 8''
39.	Coal, ...	1' 0'' to 397' 11''	1' 0'' to 359' 8''
40.	Slate, ...	6'' to 398' 5''	6'' to 360' 2''
41.	Coal, ...	11'' to 399' 4''	11'' to 361' 1''
42.	Slate, ...	5' 9'' to 405' 1''	5' 8'' to 366' 9''
43.	Coal, ...	2' 8'' to 407' 9''	2' 7'' to 369' 4''
44.	Slate, ...	8' 10' to 416' 7''	8' 8'' to 378' 0''
45.	Dark rock, ...	9' 7'' to 426' 2''	9' 5'' to 387' 5'
46.	Sandstone, ...	3' 10'' to 430' 0''	3' 9'' to 391' 2

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 4, at Drifton colliery, about 400' south of mouth of slope No. 1.

Cross Creek basin.

No. of strata.	*Description.* (Dip 6° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	10' 0'' to 10' 0''	9' 11'' to 9' 11''
2.	Sandstone, ...	32' 0'' to 42' 0''	31' 10'' to 41' 9''
3.	Top bench of cong.,	52' 0'' to 94' 0''	51' 9'' to 93' 6''
4.	Bottom bench cong.,	107' 0'' to 201' 0''	106' 6'' to 200' 0''
5.	Green shale, . . .	29' 0' to 230' 0''	28' 10'' to 228' 10''
6.	Sandstone, ...	18' 0'' to 248' 0''	17' 11'' to 246' 9''
7.	Red shale, ...	22' 0'' to 270' 0''	21' 11'' to 268' 8''
8.	Green sandstone, .	17' 0'' to 287' 0''	16 11'' to 285' 7''
9.	Red shale, ...	23' 0'' to 310' 0''	22' 11'' to 308' 6''
10.	Green sandstone, .	54' 0'' to 364' 0''	53' 9'' to 362' 3''
11.	Green sandstone, coarse and hard,	17' 0'' to 381' 0''	16' 11'' to 379' 2''

No. of strata.	*Description.* (Dip 6° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
12.	Hard greenish cong.	31′ 0″ to 412′ 0′	30′ 10″ to 410′ 0″
13.	Green sandstone, .	4′ 6″ to 416′ 6″	4′ 6″ to 414′ 6″
14.	Red shale, ...	13′ 6″ to 430′ 0″	13′ 5″ to 427′ 11″
15.	Greenish shale. . .	14 0″ to 444′ 0″	13′ 11″ to 441′ 10″
16.	Hard greenish SS.,	12′ 0″ to 456′ 0″	11′ 11″ to 453′ 9″
17.	Cong. fine, greenish with quartz pebbles, ...	23′ 0″ to 479′ 0″	22′ 11″ to 476′ 8″
18.	Cong. fine, with larger pebbles, .	9′ 0″ to 488′ 0″	8′ 11″ to 485′ 7″
19.	Strata, ...	7′ 0″ to 495′ 0″	6′ 11″ to 492′ 6″

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 1, at Lattimer colliery, about 1000′ south-west of slope No. 1.

Little Black Creek basin.

No. of strata.	*Description.* (Dip 20° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Sand and clay, .	11′ 0″ to 11′ 0″	10′ 4″ to 10′ 4″
2.	Sand and fine pebble rock, . . .	10′ 7″ to 21′ 7″	9′ 11″ to 20′ 3″
3.	Coal, ...	1′ 1″ to 22′ 8″	1′ 0″ to 21′ 3″
4.	Slate, ...	1′ 5″ to 24′ 1″	1′ 4″ to 22′ 7″
5.	Coal, ...	6′ 8″ to 30′ 9″	6′ 3″ to 28′ 10″
6.	Sand rock, . . .	6′ 6″ to 37′ 3″	6′ 1″ to 34′ 11″
7.	Black sand rock,	4′ 10″ to 42′ 1″	4′ 6″ to 39′ 5″
8.	Dark sand rock, .	3′ 8″ to 45′ 9″	3′ 5″ to 42′ 10″
9.	Sandy slate, . . .	5′ 0″ to 50′ 9″	4′ 8″ to 47′ 6″
10.	Blue rock, hard,	15′ 1″ to 65′ 10″	14′ 2″ to 61′ 8″
11.	Coal, ...	1″ to 65′ 11″	1″ to 61′ 9″
12.	Black slate, . . .	4′ 3″ to 70′ 2″	4′ 0″ to 65′ 9″
13.	Coal, ...	2′ 3″ to 72′ 5″	2′ 1″ to 67′ 10″
14.	Black slate with streaks of sulphur, ...	11′ 6″ to 83′ 11″	10′ 10″ to 78′ 8″
15.	Black slate, . . .	7′ 5½″ to 88′ 4½″	4′ 2″ to 82′ 10″
16.	Coal, ...	7½″ to 89′ 0″	7″ to 83′ 5″
17.	Black slate, . . .	1′ 0″ to 90′ 0″	11″ to 84′ 4″
18.	Pebble rock, hard,	18′ 1½″ to 108′ 1½″	17′ 1″ to 101′ 5″
19.	Blue rock with fine pebbles, .	10′ 4″ to 118′ 5½″	9′ 9″ to 111′ 2″
20.	Black slate, . . .	1′ 3½″ to 119′ 9″	1′ 3″ to 112′ 5″
21.	Blue rock with pebbles, . . .	17′ 9″ to 137′ 6″	16′ 8″ to 129′ 1″

No. of strata.	*Description.* (Dip 50° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
32.	Black slate with coal,	8′ 6″ to 322′ 2½″	5′ 6″ to 207′ 9″
33.	Pebble rock,	1′ 2″ to 323′ 4½″	9″ to 208′ 6″
34.	Black pebble rock,	13′ 0″ to 336′ 4½″	8′ 4″ to 216′ 10″
35.	Blue rock with pebbles,	12′ 6″ to 348′ 10½″	8′ 0″ to 224′ 10″
36.	Blue rock, sand, soft,	13′ 4½″ to 363′ 3″	8′ 7″ to 233′ 5″
37.	Blue rock with pebbles,	22′ 11″ to 385′ 2″	14′ 9″ to 248′ 2″
38.	Coal,	4″ to 385′ 6″	3″ to 248′ 5″
39.	Blue rock,	10″ to 386′ 4″	6″ to 248′ 11″
40.	Pebble rock,	2′ 7″ to 388′ 11″	1′ 8″ to 250′ 7″
41.	Coal and slate,	1′ 4″ to 390′ 3″	10″ to 251′ 5″
42.	Blue rock,	3″ to 390′ 6″	2″ to 251′ 7″
43.	Coal,	2′ 0″ to 392′ 6″	1′ 3″ to 252′ 10″
44.	Blue slate and clot,	22′ 11½″ to 415′ 5½″	14′ 9″ to 267′ 7″
45.	Blue rock with pebbles,	69′ 5″ to 484′ 10½″	44′ 8″ to 312′ 3″
46.	Blue and pebble rock,	24′ 8″ to 509′ 6½″	15′ 11″ to 328′ 2′
47.	Blue rock with pebbles,	8′ 0″ to 517′ 6½″	5′ 2″ to 333′ 4″
48.	Coal,	7″ to 518′ 1½″	5″ to 333′ 9″
49.	Blue rock,	18′ 10″ to 536′ 11½″	12′ 1″ to 345′ 10″
50.	Black rock with coal,	4′ 0″ to 540′ 11½″	2′ 7″ to 348′ 5′
51.	Black slate,	2′ 4″ to 543′ 3½″	1′ 6″ to 349′ 11″
52.	Gray rock,	10′ 1′ to 553′ 4½″	6′ 6″ to 356′ 5″
53.	Fine pebble rock,	9′ 1″ to 562′ 5½″	5′ 10″ to 362′ 3″
54.	Coal, good,	1′ 6½″ to 564′ 0″	1′ 0″ to 363′ 3″
55.	Coal and slate,	2′ 0″ to 566′ 0″	1′ 3″ to 364 6″
56.	Black slate,	7′ 0″ to 573′ 0″	4′ 6″ to 369′ 0″
57.	Blue rock,	9′ 5″ to 582′ 5″	6′ 1″ to 375′ 1
58.	Pebble rock,	10′ 9″ to 593′ 2″	6′ 11″ to 382′ 0″
59.	Hard conglomerate,	27′ 5″ to 620′ 7″	17′ 8″ to 399′ 8″
60.	Blue rock with streaks of slate,	13′ 6″ to 634′ 1″	8′ 8″ to 408′ 4″
61.	Blue rock with large pebbles,	6′ 0″ to 640′ 1″	3′ 10″ to 412′ 2′
62.	Hard conglomerate,	6′ 0″ to 646′ 1″	3′ 10″ to 416′ 0″
63.	Blue sand rock,	3′ 2″ to 649′ 3″	2′ 0″ to 418′ 0″
64.	Conglomerate,	6′ 2″ to 655′ 5″	4′ 0″ to 422′ 0″
65.	Green sand rock,	38′ 4″ to 693′ 9″	24′ 8″ to 446′ 8″
66.	Green cong.,	59 0″ to 752′ 9″	37′ 11″ to 484′ 7″
67.	Green sand rock,	7′ 11″ to 760′ 8″	5′ 1″ to 489′ 8″
68.	Green sand rock and red shale,	14′ 4″ to 775′ 0″	9′ 3″ to 498′ 11″

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of the Buck Mountain bed, at Drifton colliery, in the flat S. W. workings adjoining the north line of the Black Creek Improvement Company's property, showing split in the coal.

Cross Creek basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Coal,		4′ 11″ to 4′ 11″
2.	Slate,		8″ to 5′ 7″
3.	Bone,		10″ to 6′ 5″
4.	Slate,		5″ to 6′ 10″
5.	Coal,		1′ 0″ to 7′ 10″
6.	Sandstone,		5′ 0″ to 12′ 10″
7.	Coal (clean),		4′ 0″ to 16′ 10″
	Total coal,	9′ 11″	
	Total thickness,	16′ 10″	

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 5, at Milnesville colliery, near railroad switch, about 800′ west of slope No. 6.

Little Black Creek basin.

No. of strata.	*Description.* (Dip 30° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Sand and clay,	12′ 0″ to 12′ 0″	10′ 5″ to 10′ 5″
2.	Shelly coal and slate (mammoth coal bed),	31′ 0″ to 43′ 0″	27′ 0″ to 37′ 5″
3.	Soft slate,	34′ 10½″ to 77′ 11½″	30′ 4″ to 67′ 9″
4.	Coal,	8″ to 78′ 7½″	7″ to 68′ 4″
5.	Black slate,	3′ 0″ to 81′ 7½″	2′ 7″ to 70′ 11″
6.	Dark blue sand rock,	37′ 2″ to 118′ 9½″	32′ 4″ to 103′ 3″
7.	Coal,	1′ 3″ to 120′ 0½″	1′ 1″ to 104′ 4″
8.	Slate,	9″ to 120′ 9½″	8″ to 105′ 0″
9.	Coal,	1′ 6″ to 122′ 3½″	1′ 4″ to 106′ 4′
10.	Black slate,	17′ 2″ to 139′ 5½″	14′ 11″ to 121′ 3″
11.	Fine black rock,	10′ 3″ to 149′ 8½″	8′ 11″ to 130′ 2″
12.	Dark, fine sand rock,	4′ 6″ to 154′ 2½″	3′ 11″ to 134′ 1″
13.	Black slate,	3″ to 154′ 5½″	3″ to 134′ 4″
14.	Coal,	3′ 0″ to 157′ 5½″	2′ 7″ to 136′ 11″
15.	Black slate,	2′ 0″ to 159′ 5½″	1′ 9″ to 138′ 8″
16.	Black sand rock,	10′ 3″ to 169′ 8½″	8′ 11″ to 147′ 7″

No. of strata.	*Description.* (Dip 30° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
17.	Pebble rock, . .	12′ 6″ to 182′ 2½″	10′ 11″ to 158′ 6″
18.	Dark blue sand rock, ...	11′ 0″ to 193′ 2½″	9′ 7″ to 168′ 1″
19.	Pebble rock, . .	62′ 9″ to 255′ 11½″	54′ 8″ to 222′ 9″
20.	Coal, good, . . .	10″ to 256′ 9½″	9″ to 223′ 6″
21.	Pebble rock, . .	6″ to 257′ 3½″	5″ to 223′ 11″
22.	Black slate, . .	10″ to 258′ 1½″	9″ to 224′ 8″
23.	Fine blue sand rock, ...	11′ 3″ to 269′ 4½″	9′ 9″ to 234′ 5″
24.	Blue sand rock with pebbles, .	25′ 6″ to 294′ 10½″	22′ 2″ to 256′ 7″
25.	Black slate, . .	6′ 0″ to 300′ 10½″	5′ 3″ to 261′ 10″
26.	Blue sand rock,	2′ 0′ to 302′ 10½″	1′ 9″ to 263′ 7″
27.	Black slate, . .	3′ 0″ to 305′ 10½″	2′ 7″ to 266′ 2″
28.	Coal, ...	8″ to 306′ 6½″	7″ to 266′ 9″
29.	Black sandy slate, ...	7′ 8″ to 314′ 2½″	6′ 8″ to 273′ 5″
30.	Fine, dark blue rock, ...	7′ 6″ to 321′ 8½″	6′ 6″ to 279′ 11″
31.	Conglomerate, .	13 6″ to 335′ 2½″	11′ 9″ to 291′ 8″

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Coal beds from Diamond drill hole No. 8, at Drifton colliery.

Cross Creek basin.

No. of strata.	*Description.* (Dip 10° S.)		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
24.	Coal,	Mammoth bed.	10′ 9″ to 253′ 4″	10′ 6″ to 218′ 1″
25.	Slate,		1′ 7″ to 254′ 11″	1′ 7″ to 219′ 8″
26.	Coal,		12′ 7″ to 267′ 6′	12′ 4″ to 232′ 0″
27.	Slate,		2′ 3″ to 269′ 9″	2′ 1″ to 234′ 1″
28.	Coal,		8′ 4″ to 278′ 1″	8′ 2″ to 242′ 3″
29.	Slate, ...		11′ 7″ to 289′ 8″	11′ 4″ to 253 7″
30.	Coal,	Parlor and Wharton beds.	1′ 0″ to 290′ 8″	1′ 0″ to 254′ 7″
31.	Slate,		6″ to 291′ 2″	6″ to 255′ 1″
32.	Coal,		10″ to 292′ 0″	10″ to 255′ 11″
33.	Slate,		1′ 1″ to 293′ 1″	1′ 1″ to 257′ 0″
34.	Coal,		6′ 6″ to 299′ 7″	6′ 4″ to 263′ 4″
		Total coal, . . .	39′ 2″	
		Total thickness,	55′ 9″	

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 4, at Milnesville slope No. 7, in lowest lift 175' east of slope.

Little Black Creek basin.

Driven southward at an angle of 45° with horizon.

No. of strata.	*Description.* (Dip 56° N.)	*Thicknesses measured perpendicular to dip.*
1.	Slate,	6'' to 6''
2.	Coal,	8' 6'' to 4' 0''
3.	Bony coal,	3' 6'' to 7' 6''
4.	Coal,	3' 6'' to 11' 0''
5.	Sandy slate,	30' 5'' to 41' 5''
6.	Coal,	10'' to 42' 3''
7.	Slate,	9' 2'' to 51' 5''
8.	Coal,	3' 8'' to 55' 1''
9.	Slate,	5' 4'' to 60' 5''
10.	Coal,	4'' to 60 9''
11.	Sandy slate,	10' 0'' to 70' 9''
12.	Dark sandstone with fine pebbles,	28' 9'' to 99 6''
13.	Pebble rock,	10' 2'' to 109' 8''
14.	Slate with streaks of coal,	6' 1'' to 115' 9''
15.	Gray slate,	6' 1'' to 121' 9''
16.	Blue sandstone,	10 6'' to 123' 3''
17.	Fine pebble rock,	8' 0'' to 140 3''
18.	Coal (good),	2' 6'' to 142' 9''
19.	Sandy slate,	15 1'' to 157' 10''
20.	Fine blue sandstone,	11' 0'' to 168' 10'
21.	Fine blue sandstone with pebbles,	79' 3'' to 248' 1''
22.	Pebble rock,	5' 2'' to 253' 3''
23.	Coal,	3' 2'' to 256' 5''
24.	Slate,	8'' to 257 1''
25.	Block rock,	67' 4'' to 324' 5''
26.	Fine pebble rock,	13' 0'' to 337' 5''
27.	Dark sandstone,	10' 3'' to 347' 8''
28.	Conglomerate,	18' 4'' to 366' 0'

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

General section of coal beds as found in tunnel No. 5, slope No. 1, west of Drifton.

Cross Creek basin.

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
1.	Coal,	4' 5'' to 4' 5''
2.	Slate,	4'' to 4' 9''
3.	Coal,	3' 5'' to 8' 2''
4.	Slate,	3'' to 8' 5''

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
5.	Coal,	5' 6" to 13' 11"
6.	Slate,	2" to 14' 1"
7.	Coal,	4' 3" to 18' 4"
8.	Slate,	1' 0" to 19' 4"
9.	Coal,	1' 7" to 20' 11"
10.	Slate,	5" to 21' 4"
11.	Coal,	3' 11" to 25' 3"
12.	Slate,	9' 0" to 34' 3"
13.	Coal,	9" to 35' 0"
14.	Slate,	4" to 35' 4"
15.	Coal,	1' 4" to 36' 8"
16.	Slate,	1' 3" to 37' 11"
17.	Coal,	1' 0" to 38' 11'
18.	Bone,	7" to 39' 6"
19.	Coal,	2' 6" to 42' 0"

Total coal, ... 28' 8"
Total thickness, ... 42' 0"

See Columnar Section Sheet No. I and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 3, in lowest lift of Milnesville slope No. 7, 175' east of slope.

Little Black Creek basin.

No. of strata.	*Description.* (Dip about 50° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Slate,	8' 0" to 8' 0"	6' 1" to 6' 1"
2.	Coal,	2' 0" to 10' 0"	1' 6" to 7' 7"
3.	Slate,	10" to 10' 10"	8" to 8' 3"
4.	Coal,	3' 6" to 14' 4"	2' 8" to 10' 11"
5.	Bone and slate,	1' 6" to 15' 10"	1' 2" to 12' 1"
6.	Coal,	3' 0" to 18' 10"	2' 4" to 14' 5"
7.	Slate,	3' 10" to 22' 8"	2' 11" to 17' 4"
8.	Coal,	3' 4" to 26' 0"	2' 7" to 19' 11"
9.	Sandy slate,	22' 6" to 48' 6"	17 3" ta 37' 2"
10.	Slate,	3' 8" to 52' 2"	2' 10" to 40' 0"
11.	Coal,	8" to 52' 10"	6" to 40' 6"
12.	Slate,	9' 4" to 62' 2"	7' 2" to 47' 8"
13.	Coal,	2' 0" to 64' 2"	1' 6" to 49' 2"
14.	Slate,	4" to 64' 6"	3" to 49' 5"
15.	Coal,	2' 0" to 66' 6"	1' 6" to 50' 11"
16.	Slate,	6' 6" to 73' 0"	5' 0" to 55' 11"
17.	Coal,	1' 2" to 74' 2"	11" to 56' 10'
18.	Slate,	6' 0" to 80' 2"	4' 7" to 61' 5'
19.	Gray rock,	19' 1" to 99' 3"	14' 7" to 76' 0'
20.	Pebble rock,	2' 3" to 101' 6"	1' 9" to 77' 9'

No. of strata.	Description. (Dip about 50° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
21.	Slate, ...	1′ 6″ to 103′ 0″	1′ 2″ to 78 11″
22.	Blue sandstone, . .	9′ 11″ to 112′ 11″	7′ 7″ to 86′ 6″
23.	Pebble rock, . . .	7′ 6″ to 120′ 5″	5′ 9″ to 92′ 3″
24.	Block rock, ...	2′ 6″ to 122′ 11″	1′ 11″ to 94′ 2″
25.	Pebble rock, . . .	15′ 0″ to 137′ 11′	11′ 6″ to 105′ 8″
26.	Block rock, ...	8′ 0′ to 145′ 11″	6′ 2″ to 111′ 10″
27.	Slate with sulphur,	10′ 8″ to 156′ 7″	8′ 2″ to 120′ 0″
28.	Fine pebble rock, .	10′ 10″ to 167′ 5″	8′ 4″ to 128′ 4″
29.	Slate, ...	3″ to 167′ 8″	2″ to 128′ 6″
30.	Fine pebble rock, .	1′ 0″ to 168′ 8″	9″ to 129′ 3″
31.	Coal, good, ...	2′ 6″ to 171′ 2″	1′ 11″ to 131′ 2″
32.	Slate, ...	14′ 7″ to 185′ 9″	11′ 2″ to 142′ 4″
33.	Blue rock with fine pebbles, ...	43 6″ to 229′ 3″	33′ 4″ to 175′ 8″
34.	Pebble rock, . . .	60′ 10″ to 290′ 1″	46′ 7″ to 222′ 3″
35.	Blue sandstone, . .	48′ 9″ to 338′ 10″	37′ 4″ to 259′ 7″
36.	Coal, ...	2′ 10″ to 341′ 8″	2′ 2″ to 261′ 9″
37.	Slate, ...	8′ 6″ to 350′ 2″	6′ 6″ to 268′ 3″
38.	Sandy slate, ...	6′ 6″ to 356′ 8″	5′ 0″ to 273′ 3″
39.	Dark sandstone, .	10′ 0″ to 366′ 8″	7′ 8″ to 280′ 11″
40.	Pebble rock, . . .	8′ 0″ to 374′ 8″	6′ 1″ to 287′ 0″
41.	Slate, ...	5′ 9″ to 380′ 5″	4′ 5″ to 291′ 5′
42.	Blue sandstone with fine pebbles, . . .	50′ 0″ to 430′ 5″	38′ 4″ to 329′ 9″
43.	Coal, good, ...	2′ 1″ to 432′ 6″	1′ 7″ to 331′ 4″
44.	Slate, ...	6′ 4′ to 438′ 10″	4′ 10″ to 336′ 2′
45.	Fine sandstone, . .	26′ 2″ to 465′ 0′	20′ 1″ to 356′ 3″
46.	Coal, ...	2″ to 465′ 2″	2″ to 356′ 5″
47.	Pebble rock, . . .	15′ 6″ to 480′ 8″	11′ 10″ to 368′ 3″
48.	Slate, ...	2′ 1″ to 482′ 9″	1′ 7″ to 369′ 10″
49.	Coal, shelly, . . .	1′ 0″ to 483′ 9′	9″ to 370′ 7″
50.	Rotten slate and coal, ...	15′ 0″ to 498 9″	11′ 6′ to 382′ 1″
51.	Conglomerate, . .	6′ 8″ to 505′ 5″	5′ 1″ to 387′ 2″

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Mammoth Coal bed, at Milnesville colliery.

Little Black Creek basin.

No. of strata.	Description.	Thicknesses measured perpendicular to dip.
1.	Coal "top bench,"	6′ 0″ to 6′ 0″
2.	Coal "four-foot bench,"	4′ 0″ to 10′ 0″
3.	Coal, ...	2′ 0″ to 12′ 0″
4.	Coal, ...	2′ 0″ to 14′ 0″

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
5.	Coal,	7' 0'' to 21' 0''
6.	Coal,	2' 0'' to 23' 0''
7.	Coal,	4 0'' to 27' 0''
8.	Coal "parlor,"	2' 0'' to 29' 0''
9.	Stone,	1' 0'' to 30' 0''
10.	Coal,	3' 6'' to 33 6''
11.	Bone,	1' 6'' to 35' 0''
12.	Coal, "Wharton,"	3' 6'' to 38' 6''
	Total coal, 36' 0'	
	Total thickness, 38' 6'	

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 1, at Hollywood colliery, about 250' south of mouth of slope No. 2.

Little Black Creek basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	Surface,	14' 0'' to 14' 0''
2.	Mammoth coal bed,	23' 5'' to 37' 5''
3.	Slate,	10' 11'' to 48' 4''
4.	Coal,	10'' to 49' 2''
5.	Slate,	8' 2'' to 57' 4''
6.	Black slate,	14' 0'' to 71' 4''
7.	Coal,	2' 6'' to 73' 10''
8.	Slate,	11' 3'' to 85' 1''
9.	Sandy slate,	7' 1'' to 92' 2''
10.	Fire clay,	23' 0'' to 115' 2''
11.	Coal,	1' 6'' to 116' 8'
12.	Black slate,	11' 0'' to 127' 8''
13.	Sand rock,	15' 0'' to 142' 8''
14.	Hard rock,	12' 6'' to 155' 2''
15.	Blue rock,	10' 3'' to 165' 5''
16.	Coal and slate,	10' 9'' to 176' 2''
17.	Pebble rock,	1' 10'' to 178' 0''
18.	Blue rock,	4' 0'' to 182' 0''
19.	Pebble rock,	36' 4'' to 218' 4''
20.	Hard rock,	11' 7'' to 229' 11''
21.	Iron conglomerate rock,	18' 7'' to 248' 6''
22.	Blue sand rock,	37' 2'' to 285' 8''
23.	Sandy slate,	33' 3'' to 318' 11''
24.	Hard sand rock,	14' 8'' to 333' 7''
25.	Sandy slate,	7' 8'' to 341' 3''
26.	Blue sand rock,	5' 7'' to 346' 10''
27.	Slate,	3' 10'' to 350' 8''
28.	Black slate,	4' 0'' to 354' 8''

No. of strata.	*Description.*	*Thicknesses measured vertically.*
29.	Slate and coal,	3′ 0″ to 357′ 8″
30.	Coal (good),	32′ 1″ to 389′ 9″
31.	Slate,	1′ 1″ to 390′ 10″
32.	Coal (good),	4′ 9″ to 395′ 7″
33.	Black slate,	22′ 3″ to 417′ 10″
34.	Coal shelly,	1′ 6″ to 419′ 4″
35.	Black slate,	4′ 6″ to 423′ 10″
36.	Hard rock,	3′ 3″ to 427′ 1″
37.	Blue rock,	10′ 0″ to 437′ 1″
38.	Coal and slate,	7′ 2″ to 444′ 3″
39.	Blue rock,	12′ 4″ to 456′ 7″
40.	Black slate,	16′ 0″ to 472′ 7″
41.	Sandy slate,	16′ 3″ to 488′ 10″
42.	Sandy rock,	42′ 2″ to 531′ 0″
43.	Coal,	1′ 8″ to 532′ 8″
44.	Black slate,	1′ 4″ to 534′ 0″
45.	Iron conglomerate,	34′ 9″ to 568′ 9″
46.	Blue sand rock,	57′ 7″ to 626′ 4″
47.	Hard conglomerate,	10′ 9″ to 637′ 1″
48.	Black slate,	1′ 0″ to 638′ 1″
49.	Sand rock,	4′ 2″ to 642′ 3″
50.	Conglomerate,	2′ 0″ to 644′ 3″
51.	Sand rock,	3′ 3″ to 647′ 6″
52.	Conglomerate,	10′ 0′ to 657′ 6″
53.	Blue sand rock,	6′ 1″ to 663′ 7″
54.	Pebble rock,	4′ 10″ to 668′ 5″

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 2, at Hollywood colliery, about 200′ south of mouth of slope No. 2.

Little Black Creek basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	Surface,	14′ 0″ to 14′ 0″
2.	Slate,	9′ 9″ to 23′ 9″
3.	Coal,	5′ 3″ to 29′ 0″
4.	Slate,	40′ 7″ to 69′ 7″
5.	Mammoth coal bed,	23′ 10″ to 93′ 5″
6.	Slate,	12′ 0″ to 105′ 5″
7.	Coal,	9″ to 106′ 2″
8.	Slate,	30′ 5″ to 136′ 7″
9.	Coal,	2′ 0″ to 138′ 7″
10.	Slate,	57′ 0″ to 195′ 7″
11.	Coal,	9″ to 196 4″

No. of strata.	*Description.*	*Thicknesses measured vertically.*
12.	Slate,	29′ 10″ to 226′ 2″
13.	Coal,	6″ to 226′ 8″
14.	Slate,	11′ 7″ to 238′ 3″
15.	Coal,	30′ 6″ to 268′ 9″
16.	Slate,	12′ 9″ to 281′ 6″
17.	Coal, bony,	7″ to 282′ 1″
18.	Slate,	8′ 3″ to 290′ 4″

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 3 (?), at Hollywood colliery, about 650′ west of slope No. 2.

Little Black Creek basin.

No. of strata.	*Description.* (Dip 37° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Clay and dirt,	17′ 7″ to 17′ 7″	14′ 1″ to 14′ 1″
2.	Black slate,	5′ 6″ to 23′ 1″	4′ 5″ to 18′ 6″
3.	Coal, soft,	2′ 6″ to 25′ 7″	2′ 0″ to 20′ 6″
4.	Slate,	2′ 5″ to 28′ 0″	1′ 11″ to 22′ 5″
5.	Coal, good,	12′ 10″ to 40′ 10″	10′ 3″ to 32′ 8″
6.	Slate,	8″ to 41′ 6″	6″ to 33′ 2″
7.	Coal,	3′ 11″ to 45′ 5″	3′ 2″ to 36′ 4″
8.	Slate,	6″ to 45′ 11″	5″ to 36′ 9″
9.	Coal,	12′ 7″ to 58′ 6″	9′ 11″ to 46′ 8″
10.	Slate,	7″ to 59′ 1″	6″ to 47′ 2″
11.	Coal,	13′ 4″ to 72′ 5′	10′ 8″ to 57′ 10″
12.	Soft sulphur slate,	1′ 2″ to 73′ 7″	1′ 0″ to 58 10″
13.	Coal, good,	2′ 1″ to 75′ 8″	1′ 8″ to 60′ 6″
14.	Slate,	7″ to 76′ 3′	6″ to 61′ 0″
15.	Coal,	9″ to 77′ 0″	7″ to 61′ 7″
16.	Slate,	1′ 1″ to 78′ 1″	11″ to 62′ 6″
17.	Coal, good,	5′ 7″ to 83′ 8″	4′ 6″ to 67′ 0″
18.	Slate and coal,	1′ 10″ to 85′ 6″	1′ 6″ to 68′ 6″
19.	Coal,	9′ 1″ to 94′ 7″	7′ 3″ to 75′ 9″
20.	Slate,	13′ 6″ to 108′ 1″	10′ 10″ to 86′ 7″
21.	Sandy slate,	6′ 10″ to 114′ 11″	5′ 6″ to 92′ 1″
22.	Coal and slate,	6″ to 115′ 5″	5″ to 92′ 6″
23.	Sandy slate,	21′ 7″ to 137′ 0″	17′ 3″ to 109′ 9″
24.	Slate,	15′ 4″ to 152′ 4″	12′ 3″ to 122′ 0″
25.	Coal, soft,	5′ 6″ to 157′ 10″	4′ 5″ to 126′ 5″
26.	Slate,	1′ 3′ to 159′ 1″	1′ 0″ to 127′ 5″
27.	Slate,	17′ 8″ to 176′ 9″	14′ 2″ to 141′ 7″
28.	Coal,	2′ 9″ to 176′ 6″	2′ 2″ to 143′ 9″
29.	Sandy slate,	5′ 6″ to 185′ 0″	4′ ′5′ to 148′ 2″
30.	Sandstone,	21′ 4″ to 206′ 4″	17′ 1″ to 165′ 3″

No. of strata.	Description. (Dip 37° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
31.	Sandy cong., . .	3' 10" to 210' 2"	3' 1" to 168' 4"
32.	Sandstone, dark,	13' 4" to 223' 6"	10' 8" to 179' 0"
33.	Gray sand rock,	24' 3" to 247' 9"	19' 5" to 198' 5"
34.	Cong. dark, . . .	2' 2" to 249' 11"	1' 9" to 200' 2"
35.	Sandstone, dark,	1' 6" to 251' 5"	1' 2" to 201 4"

See Columnar Section Sheet No. I and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Rope Drill bore-hole No. 2, at underground "diagonal" slope, Eckley colliery.

Big Black Creek basin.

No. of Strata.	Description. (Dip 18° 30' S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	18' 0" to 18' 0"	17' 1" to 17' 1"
2.	Slate, ...	24' 0" to 42' 0"	22' 9" to 39' 10"
3.	Hard sandstone, . .	15' 0" to 57' 0'	14' 3" to 54' 1"
4.	Coal, ...	3' 0" to 60' 0"	2' 10" to 56' 11"
5.	Slate and fire clay, .	24' 0" to 84' 0"	22' 9' to 79' 8"
6.	Coarse sandstone, .	13' 0" to 97' 0"	12 4" to 92' 0'
7.	Black slate, ...	18' 0" to 115' 0"	17' 1' to 109' 1"
8.	Fire clay, ...	10' 0" to 125' 0"	9' 5" to 118' 6"
9.	Hard sandstone, . .	73' 0" to 198' 0"	69' 3" to 187' 9"
10.	Buck Mountain coal bed.		

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 1, at Eckley colliery, 1100' south of slope No. 5.

Big Black Creek basin.

No. of strata.	Description. (Dip 19° 30' N.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	30' 9" to 30' 9"	29' 0" to 29' 0"
2.	SS. and cong., . . .	9' 9" to 40' 6"	9' 2" to 38' 2'
3.	Sand rock, ...	18' 2" to 58' 8"	17' 2" to 55' 4"
4.	Dark sand rock, . .	3' 0" to 61' 8"	2' 10" to 58' 2"
5.	Fine conglomerate,	6' 11" to 68' 7"	6 6" to 64' 8"
6.	Gray rock and conglomerate, . . .	8' 9" to 77' 4"	8' 3" to 72' 11"
7.	Sand rock, ...	1' 8" to 79' 0'	1' 7" to 74' 6"

No. of strata.	*Description.* (Dip 19° 30′ N)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
8.	Sand slate and seams of coal, . .	21′ 0′ to 100′ 0″	19′ 9″ to 94′ 3″
9.	Slate and sand rock,	16′ 4″ to 116′ 4″	15′ 5″ to 109′ 8″
10.	SS. and sand, . . .	12′ 0″ to 128′ 4″	11′ 4″ to 121′ 0″
11.	Coal slate, ...	6′ 7½″ to 134′ 11½″	6 3″ to 127′ 3″
12.	Slate, ...	11″ to 135′ 10½″	9″ to 128′ 0″
13.	Slate and SS., . . .	12′ 10″ to 148′ 8½″	12′ 2″ to 140′ 2″
14.	Coal slate, ...	5′ 3½″ to 154′ 0″	5′ 0″ to 145′ 2″
15.	Coal and bone, . .	1′ 10′ to 155′ 10″	1′ 8″ to 146′ 10″
16.	Slate, ...	9′ 9″ to 165′ 7″	9′ 3″ to 156′ 1″
17.	Slate, bone and coal,	3′ 11″ to 169′ 6′	3′ 8″ to 159′ 9″
18.	Sandslate and sulphur, ...	1′ 8″ to 171′ 2″	1′ 7″ to 161′ 4″
19.	Fine gray rock, . .	13′ 0″ to 184′ 2″	12′ 3″ to 173′ 7″
20.	Fine conglomerate,	1′ 11″ to 186′ 1″	1′ 10″ to 175′ 5′
21.	Sand slate, ...	1′ 10″ to 187′ 11″	1′ 9′ to 177′ 2″
22.	Coal, slate and bone,	1′ 5″ to 189′ 4″	1′ 3″ to 178′ 5″
23.	Sand slate, ...	2′ 2″ to 191′ 6″	2′ 0″ to 180′ 5″
24.	Slate with coal and sulphur, ...	1′ 8″ to 193′ 2″	1′ 8″ to 182′ 1″
25.	Conglomerate, . .	18′ 7″ to 211′ 9″	17′ 6″ to 199′ 7″
26.	Gray sandslate, . .	1′ 7″ to 213′ 4″	1′ 6″ to 201′ 1″
27.	Conglomerate, . .	22′ 6″ to 235 10″	21′ 2″ to 222′ 3″
28.	Coal with slate seams. (Buck Mountain bed.) .	15′ 2″ to 251′ 0″	14′ 4″ to 236′ 7″
29.	Sand slate, ...	3′ 5″ to 254′ 5″	3′ 3″ to 239′ 10″
30.	Coarse gray rock,	2′ 4″ to 256′ 9″	2′ 2″ to 242′ 0″
31.	Sandslate, ...	4″ to 257′ 1″	4″ to 242′ 4″
32.	Conglomerate, . .	16′ 2″ to 273′ 3″	15′ 3″ to 257′ 7″
33.	Sandslate, ...	5″ to 273′ 8″	5″ to 258′ 0″
34.	Conglomerate, . .	10′ 8″ to 284′ 4″	10′ 0″ to 268′ 0″
35.	Dark gray rock, . .	4′ 3″ to 288′ 7″	4′ 0″ to 272′ 0″
36.	Conglomerate, . .	22′ 4″ to 310′ 11″	21′ 1″ to 293′ 1″
37.	Dark gray rock, . .	5′ 8″ to 316′ 7″	5′ 4″ to 298′ 5″
38.	Conglomerate. . .	1′ 2″ to 317′ 9″	1′ 1″ to 299′ 6″
39.	Waste, ...	1′ 3″ to 319′ 0″	1′ 2″ to 300′ 8″
40.	White flint rock, .	7′ 10″ to 326′ 10″	7′ 5″ to 308′ 1″
41.	Conglomerate, . .	2′ 6″ to 329′ 4″	2′ 4″ to 310′ 5″
42.	Sandstone, ...	10′ 0″ to 339′ 4″	9′ 5″ to 319′ 10″
43.	Conglomerate, . .	25′ 9″ to 365′ 1″	24′ 3″ to 344′ 1″
44.	Dark pebble rock,	24′ 8″ to 389′ 9″	23′ 3″ to 367′ 4″
45.	Gray sandstone, . .	16′ 0″ to 405′ 9″	15′ 1″ to 382′ 5″
46.	Dark sandstone, .	23′ 6″ to 429′ 3″	22′ 2″ to 404′ 7″

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of the Muirhead drill-hole, at Jeddo colliery, 800′ east of Ebervale Land line.

Big Black Creek basin.

No. of strata.	*Description.* (Dip 43° N.)	*Thicknesses measured vertically.*	*Thickness perpendicular to dip.*
1.	Surface, ...	64′ 6′ to 64′ 6″	47′ 2″ to 47′ 2″
2.	Sandstone, ...	2′ 0″ to 66′ 6″	1′ 6″ to 48′ 8′,
3.	Black slate, ...	10″ to 67′ 4″	7″ to 49′ 3″
4.	Sandstone, ...	26′ 4″ to 93′ 8″	19′ 3″ to 68′ 6″
5.	Soft slate, ...	36′ 6″ to 130′ 2″	26′ 9″ to 95′ 3″
6.	Sandstone, ...	68′ 2″ to 198′ 4″	49′ 10″ to 145′ 1″
7.	Mammoth coal bed, .	67′ 0″ to 225′ 4″	19′ 9″ to 164′ 10″
8.	Slate, ...	10′ to 226′ 2″	7″ to 165′ 5″
9.	Sandstone, ...	15′ 6″ to 241′ 8″	11′ 4″ to 176′ 9″
10.	Soft slate, ...	5′ 0″ to 246′ 8″	3′ 8″ to 180′ 5″
11.	Parlor coal bed, . . .	5′ 0″ to 251′ 8″	3′ 8″ to 184′ 1″
12.	Sandstone, ...	45′ 2″ to 296′ 10″	33′ 1″ to 217′ 2″
13.	Wharton coal bed, .	2′ 4″ to 299′ 2″	1′ 8″ to 218′ 10″
14.	Slate, ...	1 0″ to 300′ 2″	9″ to 219′ 7″
15.	Sandstone, ...	28′ 0″ to 328′ 2″	20′ 6″ to 240′ 1″
16.	Soft slate, ...	4′ 6″ to 332′ 8″	3′ 3″ to 243′ 4″
17.	Sandstone, ...	12′ 0″ to 344′ 8″	8′ 10″ to 252′ 2″
18.	Buck Mountain bed,	1′ 0″ to 345′ 8″	9″ to 252′ 11″
19.	Slate, ...	2′ 6″ to 348′ 2″	1′ 9″ to 254′ 8″
20.	Sandstone, ...	12′ 6″ to 360′ 8″	9′ 2″ to 263′ 10″
21.	Pebble rock, ...	23′ 8″ to 384′ 4″	17′ 4″ to 281′ 2″
22.	Alpha coal bed, . . .	10″ to 385′ 2″	7″ to 281′ 9″
23.	Slate, ...	8′ 6″ to 393′ 8″	6′ 3″ to 288′ 0″
24.	Sandstone, ...	4′ 0″ to 397′ 8″	2′ 11″ to 290′ 11″
25.	Conglomerate, . . .	7′ 6″ to 405′ 2″	5′ 6″ to 296′ 5″

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole, at pump-house, Jeddo colliery, 2000± west of slope No. 3.

Big Black Creek basin.

No. of strata.	*Description.* (Dip about 10° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	13′ 3″ to 13′ 3″	13′ 3″ to 13′ 3″
2.	Sandstone, ...	30′ 0″ to 43′ 3″	29′ 5″ to 42′ 8″
3.	Buck Mountain bed,	1′ 6″ to 44′ 9″	1′ 6″ to 44′ 2″
4.	Slate, ...	3′ 0″ to 47′ 9″	2′ 11″ to 47′ 1″
5.	Sandstone, ...	14′ 6″ to 62′ 3″	14′ 3″ to 61′ 4″
6.	Slate, ...	25′ 6″ to 87′ 9″	25′ 0″ to 86 4″
7.	Sandstone, ...	25′ 0″ to 112′ 9″	24′ 6″ to 110′ 10″

No. of strata.	*Description.* (Dip about 10° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
8.	Pebble (cong.), . . .	18′ 0″ to 130′ 9″	17′ 8″ to 128′ 6″
9.	Slate, ...	1′ 0″ to 131′ 9″	1′ 0″ to 129′ 6″
10.	Coal, ...	8″ to 132′ 5″	8″ to 130′ 2″
11.	Slate, ...	4″ to 132′ 9″	3′ 11″ to 134′ 1″
12.	Sandstone, ...	6′ 4″ to 139′ 1″	6′ 2″ to 140′ 3″
13.	Conglomerate, . . .	81′ 0″ to 220′ 1″	79′ 5″ to 219′ 8″
14.	Sandstone, ...	12′ 0″ to 232′ 1″	11′ 9″ to 231′ 5″
15.	Conglomerate, . . .	57′ 6″ to 289′ 7″	56′ 4″ to 287′ 9″
16.	Red sandstone, . . .	8′ 6″ to 298′ 1″	8′ 4″ to 296′ 1″
17.	Conglomerate, . . .	48′ 0″ to 346′ 1″	47′ 0″ to 343′ 1″
18.	Green shale, ...	4′ 0″ to 350′ 1″	3′ 11″ to 347′ 0″
19.	Red shale, ...	9′ 0″ to 359′ 1″	8′ 10″ to 355′ 10″
20.	Green sandstone, . .	17′ 0″ to 376′ 1″	16′ 8′ to 372′ 6″
21.	Red, shaly sandstone,	17′ 6″ to 393′ 7″	17′ 2″ to 389′ 8″
22.	Green sandstone, . .	4′ 0″ to 397′ 7″	3′ 11″ to 393′ 7″
23.	Red shale, ...	11′ 6″ to 409′ 1″	11′ 5″ to 405′ 0″
24.	Green sandstone, . .	16′ 6″ to 425′ 7″	16′ 2″ to 421′ 2″

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole at Jeddo colliery, about 30′ west of breaker plane, at slope No. 4.

Big Black Creek basin.

No. of strata.	*Description.* (Dip about 27½° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	21′ 6″ to 21′ 6″	19′ 1″ to 19′ 1″
2.	Slate, ...	18′ 8″ to 40′ 2″	16′ 6″ to 35′ 7″
3.	Coal, ...	5″ to 40′ 7″	5″ to 36′ 0″
4.	Slate, ...	1′ 1″ to 41′ 8″	11″ to 36′ 11″
5.	Coal, ...	6′ 6″ to 48′ 2″	5′ 5″ to 42′ 4″
6.	Slate, ...	24′ 6″ to 72′ 8″	22′ 0″ to 64′ 4″
7.	Hard black SS., . .	4′ 8″ to 77′ 4″	4′ 1″ to 68′ 5″
8.	Dark pebble rock, .	9′ 0″ to 86′ 4″	8′ 0″ to 76′ 5″
9.	Hard flinty rock, . .	12′ 8″ to 99′ 0′	11′ 3″ to 87′ 8″
10.	Soft slate, ...	7′ 0″ to 106′ 0″	6′ 2″ to 93′ 10″
11.	Slate and bone, . .	1′ 0″ to 107′ 0″	11″ to 94′ 9″
12.	Fine sandstone, . .	12′ 8″ to 119′ 8″	11′ 3″ to 106′ 0″
13.	Slate, ...	8″ to 120′ 4″	7″ to 106′ 7″
14.	Coal, ...	2′ 4″ to 122′ 8″	2′ 1″ to 108′ 8″
15.	Slate, ...	11′ 10″ to 134′ 6″	10′ 6″ to 119′ 2″
16.	Hard quartz rock, .	10′ 6″ to 145′ 0″	9′ 4″ to 128′ 6″
17.	Soft dark sandstone,	3′ 6″ to 148′ 6″	3′ 1″ to 131′ 7″
18.	Sandstone, little coal, ...	1′ 0″ to 149′ 6″	10″ to 132′ 5″
19.	Dark sandstone, . .	6′ 6″ to 156′ 0″	5′ 9″ to 138′ 2″

No. of strata.	*Description.* (Dip about 27½° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
20.	Hard rock, ...	20′ 0″ to 176′ 0″	17′ 9″ to 155′ 11″
21.	Coal, ...	6″ to 176′ 6″	5″ to 156′ 4″
22.	Slate, ...	1′ 6″ to 178′ 0″	1′ 4″ to 157′ 8″
23	Dark hard rock, . .	6′ 6″ to 184′ 6″	5′ 9″ to 163′ 5″
24.	Soft sandstone, . . .	35′ 6″ to 220′ 0″	31′ 6″ to 194′ 11″
25.	Coal, ...	2′ 0″ to 222′ 0″	1′ 9″ to 196′ 8″
26.	Coal, ...	1′ 0″ to 223′ 0″	10″ to 197′ 6″
27.	Very soft slate, . .	5′ 0″ to 228′ 0″	4′ 5″ to 201′ 11″
28.	Conglomerate, . . .	6′ 0″ to 234′ 0″	5′ 4″ to 207′ 3″

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole at dam near Trial slope, Jeddo colliery in Buck Mountain Coal bed on south side of Big Black Creek basin.

No. of Strata	*Description.* (Dip about 10° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Buck Mountain Coal bed.		
2.	Fire clay, ...	53′ 0″ to 53′ 0″	51′ 8″ to 51′ 8″
3.	Sandstone, ...	55′ 0″ to 108′ 0″	53′ 7″ to 105′ 3″
4.	Conglomerate, ...	69′ 0″ to 177′ 0″	67′ 4″ to 172′ 7″
5.	Green sandstone, . .	28′ 0″ to 205′ 0″	27′ 4″ to 199′ 11″
6.	Conglomerate, ...	64′ 0′ to 269′ 0″	62′ 5″ to 262′ 4″
7.	Sandstone, ...	17′ 0″ to 286′ 0″	16′ 7″ to 278′ 11″
8.	Conglomerate, ...	64′ 0″ to 350′ 0″	62′ 5″ to 341′ 4″
9.	Dark sandstone, . . .	5′ 0″ to 355′ 0″	4′ 10″ to 346′ 2″
10.	Red shale, ...	16′ 0″ to 371′ 0″	15′ 7″ to 361′ 9″

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 1, near mouth of slope No. 4, Ebervale colliery.

Big Black Creek basin.

No. of strata.	*Description.* (Dip 20° N.)		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...		10′ 0″ to 10′ 0″	9′ 5″ to 9′ 5″
2.	Coal (Mammoth bed),		8′ 6″ to 18′ 6′	8′ 0″ to 17′ 5″
3.	Slate,	False bottom.	6″ to 19′ 0″	6″ to 17′ 11″
4.	Coal,		10″ to 19′ 10″	9″ to 18′ 8″
5.	Slate,		4″ to 20′ 2″	4″ to 19′ 0″
6.	Coal,		1′ 6″ to 21′ 8″	1′ 5″ to 20′ 5″
7.	Slate,		2′ 10″ to 24′ 6″	2′ 8″ to 23′ 1″
8.	Coal,		4′ 1″ to 28′ 7″	3′ 10′ to 26′ 11″
9.	Slate,		1′ 8″ to 30′ 3″	1′ 6″ to 28′ 5″
10.	Coal,		1′ 4″ to 31′ 7″	1′ 3″ to 29′ 8″

No. of strata.	Description. (Dip 20° N.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
11.	Slate, ...	4' 8" to 36' 3"	4' 5" to 34' 1"
12.	Blue rock, ...	48' 2" to 84' 5"	45' 3" to 79' 4"
13.	Coal and bone, . . .	1' 0" to 85' 5"	11" to 80' 3"
14.	Black slate, ...	9' 10" to 95' 3"	9' 3" to 89' 6"
15.	Black rock, ...	11' 9" to 107' 0"	11' 0" to 100' 6"
16.	Black slate, ...	3' 6" to 110' 6"	3' 4" to 103' 10"
17.	Coal, ...	1' 1" to 111' 7"	1' 0" to 104' 10"
18.	Black slate, ...	8' 0" to 119' 7"	7' 6" to 112' 4"
19.	Black rock, ...	9' 3" to 128' 10"	8' 9" to 121' 1"
20.	Coal, ...	1' 9" to 130' 7"	1' 7" to 122' 8"
21.	Black slate, ...	5' 0" to 135' 7"	4' 9" to 127' 5"
22.	Black rock, ...	26' 4" to 161' 11"	24' 9" to 152' 2"
23.	Dark blue sand rock,	49' 1" to 211' 0"	46' 1" to 198' 3"
24.	Sandy slate, ...	6' 0" to 217' 0"	5' 8" to 203' 11"
25.	Dark blue sand rock,	151' 8" to 368' 8"	142' 6" to 346' 5"
26.	Black slate, ...	4' 6" to 373' 2"	4' 3" to 350' 8"
27.	Blue pebble rock. . .	6' 8" to 379' 10"	6' 3" to 356' 11"
28.	Black slate, ...	12' 8" to 392' 6"	11' 11" to 368' 10"
29.	Blue pebble rock, . .	20' 4" to 412' 10"	19' 1" to 387' 11"
30.	Black slate, ...	8" to 413' 6"	7" to 388' 6"
31.	Dark hard rock, . . .	7' 0" to 420' 6"	6' 8" to 395' 2"
32.	Black slate, ...	1' 8" to 422' 2"	1' 6" to 396' 8"
33.	Gray rock, ...	2' 0" to 424' 2"	1' 11" to 398' 7"
34.	Coal, ...	8" to 424' 10"	7" to 399' 2"
35.	Black sand slate. (Dip 20°.)	12' 0" to 436' 10"	11' 4" to 410' 6"
36.	Gray rock, ...	3' 6" to 440' 4"	3' 3" to 413' 9"
37.	Conglomerate, . . .	6' 4" to 446' 8"	6' 0" to 419' 9"

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 3, at Ebervale colliery, 50' east of Harleigh land line.

Big Black Creek basin.

No. of strata.	Description. (Dip 43° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	29' 0" to 29' 0"	21' 2" to 21' 2"
2.	Gray slate wash, . .	3' 0" to 32' 0"	2' 3" to 23' 5"
3.	Block slate dirt, . .	1' 0" to 33' 0"	9" to 24' 2"
4.	Mammoth coal bed,	21 3" to 54' 3"	15' 6" to 39' 8"
5.	Coal and slate, . . .	5' 4" to 59' 7"	3' 11" to 43' 7"
6.	Slate, ...	8' 5" to 68' 0"	6' 1" to 49' 8"
7.	Wharton coal bed, .	15' 2" to 83' 2"	11' 2" to 60' 10"
8.	Block slate, ...	40' 3" to 123' 5"	29' 5" to 90' 3"

No. of strata.	*Description.* (Dip 43° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
9.	Coal, slate and bone,	1' 4'' to 124' 9''	1' 0'' to 91' 3''
10.	Sandslate, ...	22' 8'' to 147' 5''	16' 7'' to 107' 10''
11.	Coal and bone, . . .	2' 10'' to 150' 3''	2' 1'' to 109' 11''
12.	Slate, ...	3' 10'' to 154' 1''	2' 9'' to 112' 8''

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 2, at Ebervale colliery, 525' south of slope No. 4.

Big Black Creek basin.

No. of strata.	*Description.* (Dip 40° N,)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	8' 0'' to 8' 0''	6' 2'' to 6' 2''
2.	Fine pebble rock, .	4' 0'' to 12' 0''	3' 0'' to 9' 2''
3.	Slate, ...	4'' to 12' 4''	3'' to 9' 5''
4.	Fine sandstone, . .	6' 3'' to 18' 7''	4' 10'' to 14' 3''
5.	Coarse sandstone, .	15' 10'' to 34' 5''	12' 1'' to 26' 4''
6.	Slate with coal, . .	2' 0'' to 36' 5''	1' 7'' to 27' 11''
7.	Red and gray slate,	4' 0'' to 40' 5''	3' 0'' to 30' 11''
8.	Fine sandrock, . . .	27' 3'' to 67' 8''	20' 11'' to 51' 10''
9.	Black slate, ...	4' 5'' to 72' 1''	3' 4'' to 55' 2''
10.	Coal, ...	1' 1'' to 73' 2''	10'' to 56' 0''
11.	Sand slate, ...	2' 6'' to 75' 8''	1' 11'' to 57' 11''
12.	Hard fine pebble rock, ...	8' 4'' to 84' 0''	6' 5'' to 64' 4
13.	Coal, ...	1' 10'' to 85' 10''	1' 5'' to 65' 9''
14.	Black slate, ...	5' 0'' to 90' 10''	3' 10'' to 69' 7''
15.	Hard blue rock, . .	14' 7'' to 105' 5''	11' 2'' to 80' 9''
16.	Pebble rock, ...	23' 10'' to 129' 3'	18' 3'' to 99' 0''
17.	Black slate, ...	12' 5'' to 141' 8''	9' 6'' to 108' 6''
18.	Fine dark sandrock,	6' 0'' to 147 8''	4' 7'' to 113' 1''
19.	Fine hard pebble rock, ...	9' 6'' to 157' 2''	7' 4'' to 120' 5''
20.	Black slate, ...	4'' to 157' 6''	3'' to 120' 8''
21.	Dark sandrock, . .	1' 0'' to 158' 6''	9'' to 121' 5''
22.	Coal, ...	2' 2'' to 160' 8''	1' 8'' to 123' 1''
23.	Black slate, ...	5'' to 161' 1''	4'' to 123' 5''
24.	Dark sandrock, . .	24' 3'' to 185' 4''	18' 6'' to 141' 11''
25.	Pebble rock and slate, ...	1' 6'' to 186' 10''	1' 2'' to 143' 1''
26.	Dark sandrock, . .	22' 11'' to 209' 9''	17' 7'' to 160' 8''
27.	Pebble and black rock, ...	4' 8'' to 214 5''	3' 7'' to 164' 3''
28.	Dark blue sandrock,	9' 9'' to 224' 2''	7' 5'' to 171' 8''

No. of strata.	*Description.* (Dip 40° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
29.	Pebble and blue rock,	11′ 0″ to 235′ 2″	8′ 6″ to 180′ 2″
30.	Pebble rock and block slate,	1′ 0″ to 236′ 2″	9″ to 180′ 11″
31.	Pebble rock,	9′ 0″ to 245′ 2″	6′ 10″ to 187′ 9″
32.	Dark blue rock,	3′ 6″ to 248′ 8″	2′ 9″ to 190′ 6″
33.	Fine pebble rock,	19′ 10″ to 268′ 6″	15′ 2″ to 205′ 8″
34.	Black slate,	1′ 0″ to 269′ 6″	9″ to 206′ 5″
35.	Dark blue rock,	6′ 4″ to 275′ 10″	4′ 10″ to 211′ 3″
36.	Hard slate,	7′ 3″ to 283′ 1″	5′ 8″ to 216′ 11″
37.	Coal,	1′ 6″ to 284′ 7″	1′ 0″ to 217′ 11″
38.	Black slate,	11′ 10″ to 296′ 5″	9′ 2″ to 227′ 1″
39.	Coal,	1′ 2″ to 297′ 7″	10″ to 227′ 11″
40.	Slate,	10′ 6″ to 308′ 1″	8′ 1″ to 236′ 0″
41.	Pebble rock,	7′ 6″ to 315′ 7″	5 8″ to 241′ 8″
42.	Conglomerate,	6′ 0″ to 321′ 7″	4′ 8″ to 246′ 4″

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Rope Drill bore-hole No. 5, at Ebervale colliery, about 1350′ west of slope No. 2.

Big Black Creek basin.

No. of strata.	*Description.* (Dip about 38° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Clay,	10′ 0″ to 10′ 0″	7′ 11″ to 7′ 11″
2.	Wash,	10′ 0″ to 20′ 0″	7′ 11″ to 15′ 10″
3.	Coal (bottom Mammoth),	10′ 0″ to 30′ 0″	7′ 11′ to 23′ 9′
4.	Slate and coal,	15′ 0″ to 45′ 0″	11′ 10″ to 35′ 7″
5.	Rock,	21′ 0″ to 66′ 0″	16′ 7″ to 52′ 2″
6.	Conglomerate,	22′ 6″ to 88′ 6″	17′ 9″ to 69′ 11″
7.	Rock,	23′ 6″ to 112′ 0″	18′ 7″ to 88′ 6″
8.	Rock,	3′ 0″ to 115′ 0″	2′ 4″ to 90′ 10″
9.	Slate,	3′ 0″ to 118′ 0″	2′ 4″ to 93′ 2″
10.	Rock and slate,	12′ 0″ to 130′ 0″	9′ 6″ to 102′ 8″
11.	Coal,	2′ 10″ to 132′ 10″	2′ 3″ to 104′ 11″
12.	Slate,	6′ 2″ to 139′ 0″	4′ 10″ to 109′ 9″
13.	Rock,	11′ 0″ to 150′ 0″	8′ 8″ to 118′ 5″
14.	Slate,	1′ 0″ to 151′ 0″	9″ to 119′ 2″
15.	Coal,	2′ 10″ to 153′ 10″	2′ 3″ to 121′ 5″
16.	Slate,	3′ 2″ to 157′ 0″	2′ 7″ to 124′ 0″
17.	Rock,	10′ 0″ to 167′ 0″	7′ 11″ to 131′ 11″
18.	Coal,	2′ 3″ to 169′ 3″	1′ 9″ to 133′ 8″
19.	Slate,	2′ 11″ to 172′ 2″	2′ 4″ to 136′ 0″
20.	Coal,	2′ 8″ to 174′ 10″	2 1″ to 138 1″

No. of strata.	*Description.* (Dip about 38° S,)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
21.	Rock, ...	6' 0'' to 180' 10''	4' 9'' to 142' 10''
22.	Sandstone, ...	15' 0'' to 195' 10''	11' 10'' to 154' 8''
23.	Conglomerate, . . .	20' 6'' to 216' 4''	16' 2'' to 170' 10''
24.	Rock, ...	4' 0'' to 220' 4''	3' 2'' to 174' 0''
25.	Slate and bone, . .	1' 6'' to 221' 10''	1' 2'' to 175' 2''
26.	Rock, ...	10' 6'' to 232' 4''	8' 3'' to 183' 5''
27.	Rock, ...	20' 0'' to 252' 4''	15' 10'' to 199' 3''
28.	Sandstone, ...	30' 0'' to 282' 4''	23' 8'' to 222' 11''
29.	Conglomerate, . . .	30' 5'' to 312' 9''	24' 0'' to 246' 11''
30.	Rock, ...	12' 0'' to 324' 9''	9' 6'' to 256' 5''
31.	Conglomerate, . . .	25' 3'' to 350' 0''	19' 11'' to 276' 4''
32.	Sandstone, ...	10' 0'' to 360' 0''	7' 11'' to 284' 3''
33.	Slate, ...	5' 0'' to 365' 0''	3' 11'' to 288' 2''
34.	Coal, ...	2' 3'' to 367' 3''	1' 9'' to 289' 11''
35.	Rock, ...	10' 0'' to 377' 3''	7' 11'' to 297' 10''
36.	Sandstone, ...	18' 0' to 395' 3'	14' 3'' to 312' 1'
37.	Conglomerate, . . .	16' 0' to 411' 3''	12' 8'' to 324' 9''
38.	Sandstone, ...	10 0'' to 421' 3'	7' 11'' to 332' 8''
39.	Rock, ...	4' 0'' to 425' 3''	3' 2'' to 335' 10'
40.	Slate, ...	3' 0'' to 428' 3''	2' 4'' to 338' 2''
41.	Coal, ...	2' 3'' to 430' 6''	1' 9'' to 339' 11''
42.	Slate, ...	5' 9'' to 436' 3''	4' 7'' to 344' 6''
43.	Sandstone, ...	16' 0'' to 452' 3''	12' 8'' to 357' 2'
44.	Conglomerate, . . .	17' 0'' to 469' 3''	13' 5'' to 370' 7''
45.	Rock, ...	5' 0'' to 474' 3''	3' 11'' to 374' 6''
46.	Slate, ...	6' 0' to 480' 3''	4' 9'' to 379' 3''
47.	Conglomerate, . . .	30' 0'' to 510' 3''	23' 8'' to 402' 11''
48.	Conglomerate, . . .	10' 0'' to 520' 3''	7' 11'' to 410' 10''
49.	Conglomerate, . . .	40' 0'' to 560' 3'	31' 7'' to 442' 5''
50.	Conglomerate, . . .	40' 0'' to 600' 3''	31' 7'' to 474' 0''

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole C, at Harleigh colliery, 500' ± west of slope No. 3.

. Big Black Creek basin.

No. of strata.	*Description.* (Dip 25° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	28' 6'' to 28' 6''	25' 10'' to 25' 10''
2.	Wharton coal bed, .	3' 3'' to 31' 9''	2' 11'' to 28' 9''
3.	Slate, ...	11' 7'' to 43' 4''	10' 6'' to 39' 3''
4.	Blue rock, ...	10' 1'' to 53' 5''	9' 2'' to 48' 5''
5.	Coal, ...	1'' to 53' 6''	1'' to 48' 6''
6.	Blue rock, ...	19' 2'' to 72' 8''	17' 4'' to 65' 10''
7.	Black rock, ...	18' 0'' to 90' 8''	16' 4'' to 82' 2''
8.	Slate, ...	27' 1'' to 117' 9''	24' 6'' to 106' 8''
9.	Coal, ...	2' 6'' to 120' 3''	2' 4' to 109' 0''
10.	Black slate, ...	7' 10'' to 128' 1''	7' 1'' to 116' 1''

No. of strata.	*Description.* (Dip 25° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
11.	Blue slate, ...	2′ 6″ to 130′ 7″	2′ 3″ to 118′ 4″
12.	Coal, ...	4′ 10″ to 135′ 5″	4′ 4″ to 122′ 8″
13.	Black slate, ...	14′ 5″ to 149′ 10″	13′ 1″ to 135′ 9″
14.	Black rock, ...	1′ 0″ to 150′ 10″	11″ to 136′ 8″
15.	Blue rock, ...	3′ 4″ to 154′ 2″	3′ 1″ to 139′ 9″
16.	Slate, ...	7′ 8″ to 161′ 10″	6′ 11″ to 146′ 8″
17.	Blue rock (Dip 25°),	24′ 10″ to 186′ 8″	22′ 6″ to 169′ 2″
18.	Conglomerate, . . .	27′ 7″ to 214′ 3″	25′ 0″ to 194′ 2″
19.	Fine blue rock, . .	6 0″ to 220′ 3″	5′ 5″ to 199′ 7″
20.	Conglomerate, . . .	6′ 0″ to 226′ 3″	5′ 5″ to 205′ 0″
21.	Black slate, ...	9′ 0″ to 235′ 3″	8′ 2″ to 213′ 2″
22.	Blue slate, ...	13′ 5″ to 248′ 8″	12′ 3″ to 225′ 5″
23.	Blue rock, ...	5′ 0″ to 253′ 8″	4′ 6″ to 229′ 11″
24.	Coal and black slate (Buck Mountain bed), ...	10′ 9″ to 264′ 5″	9′ 8″ to 239′ 7″
25.	Coal and black slate,	1′ 3″ to 265′ 8″	1′ 2″ to 240′ 9″
26.	Slate, ...	26′ 3″ to 291′ 11″	23 8″ to 264′ 7″
27.	Blue rock, ...	3′ 6″ to 295′ 5″	3′ 2″ to 267′ 9″
28.	Iron slate, ...	6′ 0″ to 301′ 5″	5′ 5″ to 273′ 2″
29.	Blue rock, ...	5′ 0″ to 306′ 5″	4′ 6″ to 277′ 8″
30.	Conglomerate, . . .	27′ 0″ to 333′ 5″	24′ 6″ to 302′ 2″
31.	Sandstone, ...	6″ to 333′ 11″	5′ to 302′ 7″
32.	Conglomerate, . . .	10′ 6″ to 344′ 5″	9′ 6″ to 312′ 1″
33.	Black rock, ...	1′ 0″ to 345′ 5″	11′ to 313′ 0″
34.	Coal and slate, . .	3′ 0″ to 348′ 5″	2′ 9″ to 315′ 9″
35.	Black slate, ...	7′ 4″ to 355′ 9″	6′ 8″ to 322′ 5″
36.	Sandstone, ...	7′ 0″ to 362′ 9″	6′ 4″ to 328′ 9′
37.	Blue sandstone, . .	15′ 11″ to 378′ 8″	14′ 5″ to 343′ 2′
38.	Conglomerate, . . .	3′ 0″ to 381′ 8″	2′ 9″ to 345′ 11″
39.	Fine conglomerate,	19′ 3″ to 400′ 11″	17′ 5″ to 363′ 4″
40.	Conglomerate, . . .	9″ to 401′ 8″	8″ to 364′ 0″
41.	Blue rock, ...	4′ 0″ to 405′ 8″	3′ 8″ to 367′ 8″
42.	Conglomerate, . . .	8′ 0″ to 413′ 8″	7′ 3″ to 374′ 11″
43.	Blue rock, ...	9′ 0″ to 422′ 8″	8′ 2″ to 383′ 1″
44.	Conglomerate, . . .	9′ 0″ to 431′ 8″	8′ 2″ to 391′ 3″
45.	Blue rock, ...	8′ 5″ to 440′ 1″	7′ 7″ to 398′ 10″
46.	Conglomerate, . . .	3′ 0″ to 443′ 1″	2′ 9″ to 401′ 7″
47.	Coal, ...	1″ to 443′ 2″	1″ to 401′ 8″
48.	Black slate, ...	3′ 8″ to 446′ 10″	3′ 4″ to 405′ 0″
49.	Blue rock, ...	4′ 10″ to 451′ 8″	4′ 5″ to 409′ 5″
50.	Slate, ...	2′ 4″ to 454′ 0″	2′ 1″ to 411′ 6″
51.	Conglomerate, . . .	20′ 11″ to 474′ 11″	19′ 0″ to 430′ 6″
52.	Blue rock, ...	2′ 1″ to 477′ 0″	1′ 11″ to 432′ 5″
53.	Fine conglomerate,	20′ 4″ to 497′ 4″	18′ 5″ to 450′ 10″
54.	Pebble rock, ...	1′ 5″ to 498′ 9″	1′ 3″ to 452′ 1″
55.	Blue rock, ...	12′ 2″ to 510′ 11″	11′ 0″ to 463′ 1″
56.	Conglomerate, . . .	20′ 7″ to 531′ 6″	18′ 8″ to 481′ 9″

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole A, at Harleigh colliery, 800′ west of slope No. 1.

Big Black Creek basin.

No. of strata.	*Description.* (Dip 45° S.)		*Thicknesses measured vertically.*			*Thicknesses perpendicular to dip.*		
1.	Surface,		19′ 0″	to	19′ 0″	13′ 5″	to	13′ 5″
2.	Blue rock,		8′ 9″	to	27′ 9″	6′ 2″	to	19′ 7″
3.	Sandrock,		15′ 0″	to	42′ 9″	10′ 8″	to	30′ 3″
4.	Slate,		2″	to	42′ 11″	1′	to	30′ 4″
5.	Sandrock,		10′ 1″	to	53′ 0″	7′ 2″	to	37′ 6″
6.	Coal,	Gamma coal bed.	1′ 6″	to	54′ 6″	1′ 0″	to	38′ 6″
7.	Slate,		4′ 5″	to	58′ 11″	3′ 2″	to	41′ 8″
8.	Blue slate,		10′ 1″	to	69′ 0″	7′ 1″	to	48′ 9″
9.	Coal,		1′ 10″	to	70′ 10″	1′ 4″	to	50′ 1″
10.	Slate,		6′ 8″	to	77′ 6″	4′ 9″	to	54′ 10″
11.	Blue rock,		15′ 1″	to	92′ 7″	10′ 8″	to	65′ 6″
12.	Slate,		2′ 0″	to	94′ 7″	1′ 5″	to	66′ 11″
13.	Gray rock,		14′ 1″	to	108′ 8″	9′ 11″	to	76′ 10″
14.	Conglomerate,		35′ 3″	to	143′ 11″	24′ 11″	to	101′ 9″
15.	Slate,		2′ 0″	to	145′ 11″	1′ 5″	to	103′ 2″
16.	Black rock,		14′ 1″	to	160′ 0″	10′ 0″	to	113′ 2″
17.	Conglomerate,		18′ 5″	to	178′ 5″	13′ 0″	to	126′ 2″
18.	Black slate,		8″	to	179′ 1″	6″	to	126′ 8″
19.	Coal,		2′ 0″	to	181′ 1″	1′ 5″	to	128′ 1″
20.	Coal and slate,		2′ 9″	to	183′ 10′	1′ 11″	to	130′ 0″
21.	Slate,		3′ 9″	to	187 7″	2′ 8″	to	132′ 8″
22.	Coal and slate,		1′ 4″	to	188′ 11″	11″	to	133′ 7″
23.	Coal,		2′ 2″	to	191′ 1″	1′ 6″	to	135′ 1″
24.	Slate,		1′ 6″	to	192′ 7″	1′ 1″	to	136′ 2″
25.	Coal,		11″	to	193′ 6″	8″	to	136′ 10″
26.	Conglomerate,		10′ 7″	to	204′ 1″	7′ 6″	to	144′ 4″
27.	Very hard cong.,		23′ 5″	to	227′ 6″	16′ 6″	to	160′ 10″
28.	Black rock,		3′ 6″	to	231′ 0′	2′ 6″	to	163′ 4″
29.	Conglomerate,		46′ 0″	to	277′ 0″	32′ 6″	to	195′ 10″
30.	Blue rock,		10′ 0″	to	287′ 0″	7′ 1″	to	202′ 11″
31.	Pebble rock,		7′ 9″	to	294′ 9″	5′ 6″	to	208′ 5″
32.	Slate,		6″	to	295′ 3″	4″	to	208′ 9″
33.	Hard conglomerate,		19′ 3″	to	314′ 6″	13′ 8″	to	222′ 5′
34.	Blue sandrock,		27′ 1″	to	341′ 7″	19′ 1″	to	241′ 6″
35.	Hard conglomerate,		4′ 4″	to	345′ 11″	3′ 1″	to	244′ 7″
36.	Blue rock,		10′ 9″	to	356′ 8″	7′ 7″	to	252′ 2″
37.	Coal,		3′ 1″	to	359′ 9″	2′ 3″	to	254′ 5′
38.	Slate,		5′ 1″	to	364′ 10″	3′ 7″	to	258′ 0″
39.	Sandy slate,		10′ 0″	to	374′ 10″	7′ 1″	to	265′ 1″
40.	Hard conglomerate,		3′ 2″	to	378′ 0″	2′ 2″	to	267′ 3″
41.	Hard pebble rock,		28′ 0½″	to	406′ 0½″	20′ 10″	to	288′ 1″
42.	Hard blue rock,		3′ 10½″	to	409′ 11″	3′ 10″	to	291′ 11″
43.	Hard pebble rock,		12′ 2½″	to	422′ 1½″	7′ 11″	to	299′ 10″
44.	Hard blue rock,		1′ 0″	to	423′ 1½″	8″	to	300′ 6″

No. of strata.	Description. (Dip 45° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
45.	Hard pebble rock, . .	13′ 6½″ to 436′ 8″	9′ 10″ to 310′ 4″
46.	Hard blue rock, . . .	6′ 0″ to 442′ 8″	4′ 3″ to 314′ 7″
47.	Hard pebble rock, . .	4′ 10″ to 447′ 6″	3′ 7″ to 318′ 2″
48.	Green argillaceous sandstone, ...	51′ 8½″ to 499′ 2½′	36′ 7″ to 354′ 9″
49.	Coarse argillaceous sandstone, ...	16′ 1″ to 515′ 3½″	11′ 4″ to 366′ 1″
50.	Conglomerate rock, .	60′ 3½″ to 575′ 7″	42′ 8′ to 408′ 9″
51.	White and green conglomerate, ...	5′ 0″ to 580′ 7″	3′ 6″ to 412′ 3″
52.	Green sandstone, . .	18′ 9″ to 599′ 4″	13′ 3″ to 425′ 6″
53.	Green and red SS., . .	4′ 0″ to 603′ 4″	2′ 10″ to 428′ 4″
54.	Red shale, ...	8′ 0″ to 611′ 4″	5′ 8″ to 434′ 0″

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore hole, west of Harleigh (probably No. 1).

Big Black Creek basin.

No. of strata.	Description.	Thicknesses measured vertically.
1.	Surface, ...	39′ 0″ to 39′ 0″
2.	Coal, ...	4′ 6″ to 43′ 6″
3.	White slate, ...	21′ 1″ to 64′ 7″
4.	Sandrock, ...	18′ 10″ to 83′ 5″
5.	Sand slate, ...	12′ 2″ to 95′ 7″
6.	Sandrock, ...	13′ 10″ to 109′ 5″
7.	Iron ore and slate, ...	5′ 0″ to 114′ 5″
8.	Sandy slate, ...	2′ 0″ to 116′ 5″
9.	Coal and bone, ...	3′ 0″ to 119′ 5″
10.	Black slate, ...	28′ 0″ to 147′ 5″
11.	Iron and slate, ...	6′ 0″ to 153′ 5″
12.	Slate, ...	35′ 1″ to 188′ 6″
13.	Slate and sandstone, ...	31′ 3″ to 219′ 9″
14.	Black slate, ...	6′ 0″ to 225′ 9″
15.	Coal (shelly), ...	1′ 8″ to 227′ 5″
16.	Rock, ...	1′ 1″ to 228′ 6″
17.	Slate, ...	1′ 6″ to 230′ 0″
18.	Coal, ...	1′ 6″ to 231′ 6″
19.	Slate, ...	3′ 0″ to 234′ 6″
20.	Coal, ...	1′ 0″ to 235′ 6″
21.	Black slate, ...	8′ 0″ to 243′ 6″
22.	Sandrock, ...	19′ 3″ to 262′ 9″
23.	Hard rock, ...	10′ 10″ to 273′ 7″
24.	Slate, ...	18′ 4″ to 291′ 11″
25.	Blue rock, ...	20′ 0″ to 311′ 11′

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole, west of Harleigh (probably No. 2).

Big Black Creek basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	Surface,	37′ 10″ to 37′ 10″
2.	Sandrock,	44′ 0″ to 81′ 10″
3.	Black slate,	2′ 0″ to 83 10′
4.	Coal,	2′ 10″ to 86′ 8″
5.	Slate,	43′ 7″ to 130′ 3″
6.	Sandrock,	32′ 9″ to 163′ 0″
7.	Slate,	15′ 5′ to 178′ 5″
8.	Fine pebble rock,	7′ 0″ to 185′ 5″
9.	Fine blue rock,	5′ 0″ to 190′ 5″
10.	Fine pebble rock,	12′ 11″ to 203′ 4″
11.	Fine blue rock,	8′ 7″ to 211′ 11″
12.	Black slate,	9′ 0″ to 220′ 11″
13.	Sandrock,	8′ 3″ to 229′ 2′
14.	Slate,	4′ 11″ to 234′ 1″
15.	Sandrock,	41′ 1″ to 275′ 2″
16.	Slate,	5′ 8″ to 280 10″
17.	Sandrock,	18′ 0″ to 298′ 10″
18.	Fine pebble rock,	18′ 0″ to 316′ 10″
19.	Slate,	43′ 0″ to 359′ 10″
20.	Sandrock,	2′ 0″ to 361′ 10″
21.	Black slate,	9′ 0″ to 370′ 10″
22.	Sandrock,	39′ 2″ to 410′ 0″
23.	Very hard rock,	28′ 9″ to 438′ 9″
24.	Slate,	2′ 0″ to 440′ 9″
25.	Blue rock,	5′ 0″ to 445′ 9″
26.	Fine blue rock,	8′ 4″ to 454 1″
27.	Coal,	1′ 3″ to 455′ 4″
28.	Blue rock,	2′ 0″ to 457′ 4″
29.	Conglomerate,	5′ 0″ to 462′ 4″
30.	Pebble rock,	14′ 0″ to 476′ 4″
31.	Green sandrock,	13′ 9″ to 490′ 1″

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole, west of Harleigh (probably No. 3).

Big Black Creek basin.

No. of strata.	*Description.* (Dip 40° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	48′ 10″ to 48′ 10″	31′ 5″ to 31′ 5″
2.	Hard blue rock, . .	22′ 4″ to 71′ 2″	14′ 4′ to 45′ 9″
3.	Conglomerate, . .	9′ 6′ to 80′ 8″	6′ 2″ to 51′ 11″
4.	Black rock, ...	4′ 9″ to 85′ 5″	3′ 1″ to 55′ 0″
5.	Blue rock, ...	3′ 3″ to 88′ 8″	2′ 1″ to 57′ 1″
6.	Black rock, ...	5′ 8″ to 94′ 4″	3′ 7″ to 60′ 8″
7.	Conglomerate, . .	16′ 0″ to 110′ 4″	10 4″ to 71′ 0″
8.	Blue rock, ...	7′ 4″ to 117′ 8″	4′ 8″ to 75′ 8″
9.	Fine conglomerate,	17′ 3″ to 134′ 11″	11′ 1″ to 86′ 9″
10.	Blue rock, ...	5′ 3″ to 140′ 2″	3′ 4″ to 90′ 1″
11.	Conglomerate, . .	2′ 8″ to 142′ 10″	1′ 8″ to 91′ 9″
12.	Blue rock, ...	3′ 1″ to 145′ 11″	2′ 0″ to 93′ 9″
13.	Conglomerate, . .	16′ 9″ to 162′ 8″	10′ 10″ to 104′ 7″
14.	Blue rock, ...	2′ 5″ to 165′ 1″	1′ 6″ to 106′ 1″
15.	Conglomerate, . .	21′ 2″ to 186′ 3″	13′ 7″ to 119′ 8″
16.	Black rock, ...	4′ 1″ to 190′ 4″	2′ 7′ to 122′ 3′
17.	Gray rock, ...	7′ 8″ to 198′ 0″	5′ 0″ to 127′ 3″
18.	Fine conglomerate,	11′ 5′ to 209′ 5″	7′ 4″ to 134′ 7″
19.	Coal, ...	1′ 2″ to 210′ 7″	9″ to 135′ 4″
20.	Conglomerate, . .	4′ 6″ to 215′ 1″	2′ 10″ to 138′ 2″
21.	Coal and slate, . .	6′ 0″ to 221′ 1″	3′ 11″ to 142′ 1″
22.	Conglomerate, . .	6′ 0″ to 227′ 1″	3′ 11″ to 146′ 0″
23.	Blue rock, ...	2′ 0″ to 229′ 1″	1′ 3″ to 147′ 3″
24.	Conglomerate, . .	1′ 6″ to 230′ 7″	1′ 0″ to 148′ 3″
25.	Blue rock, ...	2′ 6″ to 233′ 1″	1′ 7″ to 149′ 10″
26.	Conglomerate, . .	4′ 10″ to 237′ 11″	3′ 1″ to 152′ 11″
27.	Slate, ...	8″ to 238′ 7″	5″ to 153′ 4″
28.	Conglomerate, . .	16′ 6″ to 255′ 1″	10′ 7″ to 163′ 11″
29.	Dark sandstone, . .	12′ 0″ to 267′ 1″	7′ 9″ to 171′ 8″
30.	Black rock, ...	6′ 0″ to 273′ 1″	3′ 10″ to 175′ 6″
31.	Hard conglomerate,	3′ 7″ to 276′ 8″	2′ 4″ to 177′ 10″
32.	Blue rock, ...	4′ 10″ to 281′ 6″	3′ 1″ to 180′ 11″
33.	Fine conglomerate,	8′ 1″ to 289′ 7″	5′ 2′ to 186′ 1″
34.	Slate, ...	4′ 0″ to 293′ 7′	2 7″ to 188′ 8″
35.	Sandstone, ...	3′ 11″ to 297′ 6″	2′ 6″ to 191 2″
36.	Coal, ...	2″ to 297′ 8″	2″ to 191′ 4″
37.	Sandstone, ...	1′ 2″ to 298′ 10″	9″ to 192′ 1″
38.	Fine conglomerate,	4′ 3″ to 303′ 1″	2′ 9′ to 194′ 10″
39.	Hard conglomerate,	8′ 11″ to 312′ 0″	5′ 9″ to 200′ 7″

See Columnar Section Sheet No. II. and Mine Sheet No. II.

Section of the Mammoth coal bed at Ebervale colliery.

Big Black Creek basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	**Coal refuse.**	
2.	**Slate,**	**3' 6'' to 3' 6''**
3.	**COAL,**	**7' 0'' to 10' 6''**
4.	**Slate,**	**7'' to 11' 1''**
5.	**COAL,**	**2' 7'' to 13' 8''**
6.	**Slate,**	**4'' to 14' 0''**
7.	**COAL and slate,**	**2' 1'' to 16' 1''**
8.	**COAL,**	**7' 0'' to 23' 1''**
9.	**Slate,**	**4'' to 23' 5''**
10.	**COAL,**	**2' 0'' to 25' 5''**
11.	**Slate,**	**2'' to 25' 7''**
12.	**COAL,**	**6' 2'' to 31 9''**
13.	**Slate.**	
	Total coal,	**26' 10''**
	Total thickness,	**31' 9''**

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

General section of the Mammoth coal bed at Jeddo colliery.

Little Black Creek basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	**COAL, six-foot bench,**	**6' 0' to 6' 0''**
2.	**COAL, four-foot bench (top),**	**4' 0'' to 10' 0''**
3.	**COAL, poor man's bench,**	**2' 0'' to 12' 0''**
4.	**COAL, poor man's bench,**	**2' 0'' to 14' 0''**
5.	**COAL, seven-foot bench,**	**7' 0'' to 21' 0''**
6.	**COAL, two-foot bench,**	**2' 0'' to 23' 0''**
7.	**COAL, four-foot bench (bottom),**	**4' 0'' to 27' 0''**
	Total thickness,	**27' 0''**

See Columnar Section Sheet No. II and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 4, at Ebervale colliery, 1600′ west of slope No. 3.

Big Black Creek basin.

No. of strata.	*Description.* (Dip 43° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	43′ 0″ to 43′ 0″	31′ 5″ to 31′ 5″
2.	Slate wash, ...	3′ 0″ to 46′ 0″	2′ 3″ to 33′ 8″
3.	MAMMOTH BED, . .	40′ 0″ to 86′ 0″	29′ 3″ to 62′ 11″
4.	Black slate, ...	1′ 6″ to 87′ 6″	1′ 1″ to 64′ 0″
5.	COAL and bone, . . .	3′ 8″ to 91′ 2″	2′ 8″ to 66′ 8″
6.	Black slate, ...	12′ 10″ to 104′ 0″	9′ 5″ to 76′ 1″
7.	WHARTON BED, . .	7′ 0″ to 111′ 0″	5′ 1″ to 81′ 2″
8.	Black slate, ...	4′ 2″ to 115′ 2″	3′ 1″ to 84′ 3″
9.	Fine and dark sand rock, ...	10′ 1″ to 125′ 3″	7′ 4″ to 91′ 7″
	Total coal, ...	37′ 0′	
	Total thickness, .	91′ 7″	

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 1, near mouth of Gravel run, Pennsylvania Railroad Company's tract.

Big Black Creek basin.

No. of strata.	Drillers' Record.			Description.			Spec. No.
1.	Surface wash,	27'	10''				
2.	Dark slate,	1'	4''	No core but small quantity of black carbonaceous powder,	1'	4''	1
3.	Coal (with slate),	4'	0''	Black carbonaceous slate and coal,	4'	0''	*2
4.	Soft light gray sandy shale,	1'	0''	Dark gray sandy slate with specks of mica,	4'	8''	3
5.	Sand and pulverized rock,	2'	8''				
6.	Iron gray shale with graphite scales,	1'	6''	Powdered slate and coal dirt,	2'	0''	4
7.	Dark pulverized rock with particles of coal,	2'	0''	Light argillaceous slate reduced to powder,	2'	6''	5
8.	Brown sandy clay and rock (pulverized),	2'	0''				
9.	Light red and buff shales,	3'	7''	Soft reddish yellow argillaceous sandstone,	3'	2''	6
10.	Light gray SS. (fine),	1'	0''				
				No core,		6''	
				Above sandstone,		11''	
11.	Silicious dark iron gray sandstone,	17'	6''	Fine-grained silicious sandstone with specks of mica,	17'	6''	7
12.	Coarse iron gray sandstone with pebbles,	20'	6''	Dark gray silicious sandstone (3' 5'' in box 1),	6'	10''	8
				No core,		6''	
				SS. as above,	1'	8''	
				No core,		3''	
				Sandstone as above,		10''	
				No core,	1'	0''	
				Sandstone as above,	9'	4½''	
13.	Iron gray homogeneous sandstone,	15'	8''	Fine dark silicious sandstone with specks of mica,	15'	8''	9
14.	Coarse iron gray sandstone with fine pebbles,	2'	2''	Mustard seed conglomerate with black silicious matrix,	2'	2''	10
15.	Iron gray sandstone and coal slate,	2'	11''	Black carbonaceous slate with streaks of coal,		6''	11
				No core,		4''	
				Light gray sandstone with specks of mica,		1½''	12

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* Two pieces of sample.

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
				Black carbonaceous slate with streaks of coal,		7"	13
				No core,	1'	1"	
16.	Iron gray sandstone (coarse),	8'	0"	No core,		5"	
17.	Iron gray sandstone passing to slate,	10'	2½"	Fine-grained dark silicious sandstone,	3'	8"	14
				No core,	2'	0"	
				Above sandstone,	12'	1½"	
18.	Dark slate,	4	9	Very fine sandy slate,	4'	5"	15
				No core,		4"	
19.	Iron gray sandstone coarse at bottom,	5'	9½"	Dark gray silicious sandstone with knife blades of coal in the last 6",		8"	16
				No core,		4"	
				Sandstone as above,	4'	9½"	
20.	Iron gray sandstone conglomerate at bottom,	4'	2"	Mustard seed conglomerate with occasional streaks of coal,	4'	2"	17
21.	Fine iron gray sandstone with COAL seams,	6'	8"	Fine-grained dark silicious sandstone with specks of mica and streaks of coal in the last 18",	6'	8"	18
22.	Coarse iron gray sandstone with pebbles,	22'	4"	Dark gray very silicious sandstone with occasional pebbles,	22'	4"	19
23.	Black slate with streak of COAL and 1" SS.,	1'	8"	Black carbonaceous slate,	1'	8"	20
24.	Dark slate and fine sandstone,		9"	Slaty sandstone with streaks of coal and slate,		9"	21
25.	Fine iron gray sandstone,	3'	8"	Dark silicious SS.,	2'	10½"	22
26.	Fine conglomerate,	1'	9"	Fine conglomerate with dark silicious matrix,	3'	10"	23
27.	Fine iron gray sandstone with pebbles,	1'	4"				
28.	Fine sandstone,	2'	0"	Dark gray silicious SS.,	2'	0"	24
29.	Coarse iron gray sandstone with pebbles,	9'	1½"	Fine conglomerate with very dark gray matrix,	9'	1½"	25
30.	Fine iron gray sandstone,		5"	Dark gray fine-grained silicious sandstone,		5"	26
31.	Medium gray conglomerate,	2'	7"	Pea conglomerate with dark gray silicious matrix,	2'	7"	27
32.	Fine dark iron gray sandstone with slate,	8'	6"	Dark gray silicious sandstone with small seams of slate in the last 2',	8'	6"	28
33.	Medium conglomerate,	2'	8"	Conglomerate with pebbles from pea to hickory nut with gray silicious matrix,	25'	6"	29
34.	Fine iron gray sandstone with pebbles,	2'	6"				

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
35.	Medium light gray conglomerate,	2'	0''	No core,		9''	
36.	Medium gray sandstone,	1'	8''				
37.	Conglomerate sandstone,	3	0''				
38.	White silicious conglomerate,	16'	5''				

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 2, about 550' east of Lehigh Valley R. R. and 3200' south of confluence of Big Black and Cranberry creek, Pennsylvania R. R. Co.'s tract.

Stony Run basin.

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
1.	Surface wash,	15'	7 '				
2.	Red sandstone with clay,	5'	7½	No core,	1'	11''	
				Coarse argillaceous SS.,	1'	0''	1
				No core,	1'	11''	
				SS. as above,		9½''	
3.	Gray sandstone,	11'	2''	Dark gray, very silicious sandstone with occasional large pebbles,	6'	0''	2
				No core,		10''	
				SS. as above,	4'	4''	
4.	Gray sandrock,	8'	4''	Pea conglomerate with dark gray silicious matrix,	8'	4''	3
5.	Sandstone,	4'	2½''	Fine-grained dark gray silicious sandstone,	4'	2½''	4
6.	Conglomerate,	7'	8½ '	Pea conglomerate with dark gray silicious matrix, with some larger pebbles,	7'	8½''	5
7.	Fine conglomerate,	5'	6''	Fine-grained dark gray silicious sandstone with some pebbles,	5'	6''	6
8.	Coarse conglomerate,	6'	10½''	Pea conglomerate with some larger pebbles and gray silicious matrix,	6'	10''	7
9.	Fine conglomerate,	2'	10'	Fine-grained, dark gray silicious sandstone,	2'	10''	8
10.	Coarse conglomerate,	4'	1''	Pea conglomerate with some larger pebbles and dark gray silicious matrix,	4'	1''	9

No. of strata.	Drillers' Record.			Description.			Spec. No.
11.	Fine conglomerate,	2'	11''	Dark fine-grained silicious sandstone,	2'	11''	10
12.	Coarse conglomerate,	6'	8''	Pea conglomerate with some larger pebbles,	6'	8''	11
13.	Dark sandstone,		8''	Dark slaty sandstone with small seams of coal,		8'	12
14.	Coarse conglomerate,	12'	9½''	Pea conglomerate with dark gray silicious matrix,	12'	9½''	13
15.	Fine conglomerate,	5'	5½''	Dark gray silicious SS.,	5'	5½''	14
16.	Coarse conglomerate,	6'	4½''	Pea conglomerate with occasional larger pebbles,	6'	4½''	15
17.	Sandstone,	4'	10½''	Very fine-grained dark gray silicious sandstone,	4'	10½''	16
18.	Conglomerate,	22'	10''	Conglomerate with pebbles half way between pea and hickory nut,	22'	4''	17
				No core,		6''	

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 3, about 850' west of Berwick turnpike and 450' north of Big Black creek, Pennsylvania R. R. Co.'s tract.

Big Black Creek basin.

No of strata.	Drillers' Record.			Description.			Spec. No.
1.	Surface wash,	16'	4''	No core,	1'	8''	
				Light gray argillaceous SS.,	3'	3''	1
2.	Light gray sandstone with clay,	23'	10''	No core,		8''	
				Fine-grained argillaceous SS. with specks of mica and occasinal streaks of black slate,	2'	2'	2
				No core,	1'	11''	
				Soft sandy slate with specks of mica,	1'	3''	3
				No core,		5''	
				Yellow ferruginous slate,		4½''	4
				No core,		11,	

No. of strata.	*Drillers' Record.*		*Description.*		*Spec. No.*
			Light gray argillaceous sandstone with specks of mica,	5′ 5½″	5
			No core,	10½″	
			SS. as above,	9″	
			No core,	1 2½″	
			SS. as above,	2′ 11″	
3.	Dark sandstone,	1′ 9½″	Dark argillaceous SS. with specks of mica,	1′ 9½″	6
4.	Reddish sandstone,	5′ 2″	Loose argillaceous sand,	3′ 5″	7
			Very argillaceous SS. with specks of mica,	1′ 9′	8
5.	Gray sandstone,	5′ 10½″	Gray micaceous SS.,	5′ 10½″	9
6.	COAL,	1′ 6″	Coal, (this is represented in the box by powder and a few small pieces of solid coal),	1′ 6″	10
7.	Slate,	11″	Fine sandy slate,	11′	11
8.	Gray sandstone,	9′ 6″	Very fine dark gray silicious sandstone,	3′ 5″	12
			No core,	7″	
			SS. as above,	5′ 6′	
9.	Rotten slate,	5′ 8″	Loose argillaceous sand,	1′ 0″	13
			No core,	2′ 8″	
			Dark sandy slate partially ground into powder with a few small pieces,	2′ 0″	14
10.	Sandstone,	1′ 0″	Fine-grained, dark gray silicious sandstone,	1′ 0″	15
11.	Rotten slate,	4′ 2½″	No core,	8″	
			Black shaly slate with occasional streaks of coal. This is in powder mostly and in small pieces in box,	3′ 6½″	16
12.	Sandstone,	4′ 0½″	Very dark carbonaceous sandstone,	4′ 0½″	17
13.	COAL,	7″	Powdered coal and sand,	7″	18
14.	Rotten sandstone,	10′ 0″	Black slate,	3″	19
			Dark slaty sandstone (most of this core has been ground into sand except a few pieces representing the harder benches),	9′ 9″	20
15.	Sandstone,	25′ 9½′	Fine-grained dark gray silicious SS. with occasional streaks of slate,	7′ 6½″	21

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
				Dark silicious SS. with a few conglomerate pebbles toward bottom, .	18'	3"	22
16.	COAL, ...	1'	0'	Coal, ...	1'	0"	23
17.	Slate, ...		10"	Dark sandy slate, . . .		10"	24
18.	Dark sandstone, ...	11'	9½"	Black carbonaceous SS. with specks of mica, .	11'	9½"	25
19.	Sandstone, ...	4'	0"	Dark sandy slate with specks of mica, ...	4'	0"	26
20.	COAL, ...		4"	Coal, ...		4"	27
21.	Sand slate, ...	6'	3½	Black carbonaceous sandy slate, ...	6'	3½"	28
22.	Sandstone, dark and light, ...	36'	6¼"	Fine-grained very hard silicious sandstone, .	5'	4½"	29
				Pea conglomerate with dark silicious matrix and occasional streaks of fine dark sandstone,	19'	2½"	30
				Fine dark grained SS. with specks of mica, .	11'	11¼"	31
23.	Slate and bony COAL, .	1'	3½"	Carbonaceous slate, . .		2"	32
				No core, ...		8"	
				Black carbonaceous slate with streaks of coal, .		5½"	
24.	Conglomerate, ...	70'	5¼"	Pea conglomerate with dark gray silicious matrix, ...	13'	6½"	33
				Light gray and very silicious sandstone, . . .	2'	3"	34
				Conglomerate with large and small pebbles and dark gray matrix, . .	23'	9"	35
				Pea conglomerate with dark gray silicious matrix, ...	4'	10"	36
				Mustard seed conglomerate with black carbonaceous matrix and streaks of coal, ...		8"	37
				Pea conglomerate with light gray silicious matrix with pebbles increasing in size to hickory nut near bottom, ...	25'	1"	38
				No core, ...		4"	

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill hole No. 4, about 170′ west of Black Creek Hotel, Pennsylvania Railroad Company's track.

Big Black Creek basin.

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
1.	Surface, ...	25′	0″				
2.	Conglomerate, ...	7′	7½″	No core, ...	1′	3″	
				Pea conglomerate with light gray silicious matrix with gray streaks, ...	1′	8″	1
				No core, ...		4″	
				Above conglomerate, .	2′	8½″	
				No core, ...		6½″	
				Above conglomerate, .	1′	1½″	
3.	Rotten slate, ...	1′	7″	Black argillaceous slate,	1′	7″	2
				1′ 3″ is ground to powder.			
4.	Conglomerate, ...	18′	4½″	Massive quartz with argillaceous streaks, . .		7″	3
				No core, ...		6″	
				Quartz as above, ...		6″	
				No core, ...		9″	
				Above quartz, ...		8½″	
				Conglomerate with large and small pebbles, light gray silicious matrix and argillaceous streaks, ...	14′	3″	4
				No core, ...		6½″	
				Conglomerate as above,		6½″	
5.	Gray rock, ...	13′	11′	Dark gray silicious sandstone with occasional large pebbles, ...	12′	8″	5
				No core, ...		6″	
				SS. as above, ...		9″	
6.	Conglomerate, ...	12′	1″	Pea conglomerate with dark gray silicious matrix, ...	12′	1″	6
7.	Fine conglomerate, . .	6′	10″	Dark fine-grained silicious sandstone, . . .	6′	10″	7
8.	Conglomerate, ...	24′	1″	Conglomerate with large and small pebbles and light gray silicious matrix, ...	13′	2″	8
				Conglomerate with large and small pebbles and very dark silicious matrix, ...	1′		9

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
				Conglomerate with large and small pebbles and dark gray silicious matrix,	9'	11'	10
9.	Dark rock,		9"	Dark argillaceous SS.,		9"	11
10.	Conglomerate,	26'	9½"	Pea conglomerate with light gray silicious matrix,	26'	9½"	12
11.	Slate,	1'	2½"	Fine dark gray slate,	1'	2½"	13
12.	Conglomerate,		2½"	Conglomerate with gray argillaceous matrix,		2½"	14
13.	Gray sandstone,	3'	11"	Fine gray micaceous sandstone,	3'	11"	15
14.	Slate,	3'	11"	Very fine slightly sandy slate,	3'	11"	16
15.	Gray sandstone,	11'	5½"	Light gray micaceous sandstone,	11'	5½"	17
16.	Slate,	3'	1½"	Fine gray slate,	3'	1½"	18
17.	Green sandstone,	40'	1½"	Soft, light green, slaty sandstone,	6'	7"	19
				No core,		6'	
				Above SS.,	7'	6"	
				No core,		8"	
				Above SS.,	1'	4½"	
				No core,		2½"	
				Above SS.,	10'	4"	
				Light green fine-grained argillaceous and micaceous SS. with streaks of slate and a few pebbles in the lower portion,	12'	11½"	20
18.	Slate,		9"	Fine light gray sandy slate,		9"	21
19.	Green conglomerate,	34'	10"	Very fine-grained conglomerate with light greenish gray matrix,	7'	2"	22
				Pea conglomerate with dark greenish gray silicious matrix,		6"	
				No core,		6½"	
				Above conglomerate,		11"	
				No core,		1½"	
				Above conglomerate,	1'	7"	23
				Light greenish gray very silicious sandstone,	5'	0"	24
				Very silicious pea conglomerate with light green matrix,	19'		25

No. of strata.	*Drillers' Record.*		*Description.*		*Spec. No.*
20.	Fine conglomerate,	5' 1"	Very fine-grained silicious, micaceous sandstone,	5' 1"	26
21.	Coarse green conglomerate,	9' 11"	Very silicious pea conglomerate with some larger pebbles and light green matrix,	10' 11"	27
22.	Green sandstone,	4' 0"	Light green very silicious sandstone,	2' 2"	28
23.	Red shale and green sandstone mixed,	9' 5"	Red shale and green sandstone mixed,	11' 3'	29
			Bottom of hole.		

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 5, about 400' west of Berwick turnpike and 1200' south of Big Black creek. Pennsylvania Railroad Company's tract.

Big Black Creek basin.

No. of strata.	*Driller's record.*		*Description.*		*Spec. No.*
1.	Surface,	15' 8½"			
2.	Rotton slate and clod,	5' 10½"	Rotten slate and clod,	5' 10½"	1
3.	Sandstone,	49' 0"	Dark gray very silicious sandstone,	15' 0"	2
			Pea conglomerate with dark gray silicious matrix,	10' 10½"	3
			Dark gray very silicious sandstone,	21' 1½"	4
			Very dark micaceous sandstone with knife blades of COAL,	1' 0"	5
4.	Slate,	2' 2½"	Sand slate, core reduced to powder,	9"	6
			Dark slaty SS. with knife blades of COAL in lower portion,	1' 6"	7
5.	COAL,	1' 4"	COAL with 8" reduced to powder,	1' 4"	8
6.	Slate,	2' 7½"	Fine black sandy carboniferous slate,	2' 7"	9
7.	Sandstone,	11' 4"	Dark gray very silicious sandstone,	11' 4"	10

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
8.	Slate,		4'	Dark slaty SS. with knife blades of COAL,		4"	11
9.	Sandstone,	10'	7½"	Dark gray very silicious sandstone,	10'	7½"	12
10.	Dark sandstone,	5'	6½"	Dark sandy slate,	2'	6"	13
				Dark fine-grained SS.,	3'	0½"	14
11.	Gray sandstone,	2'	0"	Dark fine-grained silicious sandstone,	3'	11"	15
12.	Conglomerate,	11'	5"	Pea conglomerate with gray silicious matrix,	9'	0½"	16
				No core,		5½"	

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 6, about 200' east of Little Black creek and 2580' north of proposed railroad, Pennsylvania Railroad Company's track.

Big Black Creek basin.

No. of Strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
1.	Surface,	10'	3"				
2.	Gray sandstone,	8'	8"	No core,	1'	4"	
				Pea conglomerate with quartz pebbles and dark gray matrix,	7'	4"	1
3.	Reddish sandstone,	2'	4"	Very fine, soft, dark SS., reddish and slightly micaceous,	2'	4"	2
4.	Gray sandstone,	11'	3"	Fine dark (almost black) sandstone,	11'	3"	3
5.	Conglomerate,	36'	11"	Very silicious pea conglomerate,	10'	3"	4
				Fine dark sandstone (almost black),	2'	4"	5
				Very silicious pea conglomerate,	5'	7"	6
				Very dark, fine-grained SS. streaked with coal,	2'	0"	7
				Gray, very silicious, SS.,	7'	7"	8
				Hickory nut conglomerate,	6'	2"	9
				Small pea conglomerate, very dark matrix,	3'	0"	10

No. of Strata.	*Drillers' Record.*		*Description.*		*Spec. No.*
6.	Slate,	8"	Very fine black carboniferous slate,	8"	11
7.	Conglomerate,	5"	Fine conglomerate with very dark matrix and streaks of slate,	5"	12
8.	Slate,	1½"	Very fine black slate,	1½"	13
9.	Quartz,	1½"	White massive quartz,	1½"	14
10.	Slate,	9"	No core,	8"	
11.	Sandstone,	1' 6"	Fine black sandy slate,	1' 7"	15
12.	Fine conglomerate,	1' 10"	Very dark silicious SS., fine-grained,	1' 10"	16
13.	Coarse conglomerate,	40' 10"	Pea conglomerate with very dark-gray matrix,	5' 5"	17
			Very dark (almost black) slaty SS., fine-grained,	10"	18
			Dark-gray, very silicious sandstone,	3' 9"	19
			Pea conglomerate with dark-gray matrix and pebbles, increasing in size towards bottom,	26' 4"	20
			Dark fine-grained SS., slightly micaceous,	10' 5"	21
			Large pea conglomerate with dark silicious matrix,	3' 1"	22

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 7, near wagon road, about 960' northeast of Black Ridge Hotel, Pennsylvania R. R. Co.'s tract.

Big Black Creek basin.

No. of stata.	*Drillers' Record.*		*Description*	*Spec. No.*
1.	Surface,	23' 7"	Strata not in box.	
2.	Sandstone,	9"		
3.	Red shale,	3"		
4.	Wash,	1' 3"		
5.	Sandstone,	4"		
6.	Wash,	5' 8½"		
7.	Sandstone,	6½"		
8.	Wash,	11½"		

No. of strata.	*Drillers' Record.*			*Description.*			*Spec. No.*
9.	Reddish sandstone,	18'	1'	Reddish conglomerate with quartz pebbles with argil. matrix,	2'	8½"	1
				Loose sand,	1'	8"	2
				Same as No. 1,	11'	7½"	
				Core lost,	2'	1"	
10.	Reddish conglomerate,	6'	9½"	Argil. congl. with slate and quartz pebbles,	6'	9½"	4
11.	Rotten seam,		2"	No core,		2½"	*
12.	Rusty greenish conglomerate,	14'	2½"	Greenish SS. very silicious, massive,	14'	2½"	5
13.	Greenish sandstone,	27'	4½"	Yellowish green argilaceous, micaceous SS.,	5'	8'	6
				Fine-grained, massive greenish conglomerate,	21'	8½"	7

*No sample.

See Columnar Section Sheet No. II and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 1, at Wentz's slope, Lumber Yard.

Hazleton basin.

No. of strata.	*Description.* (Dip about 45° 30"S.)	*Thicknesses measured vertically.*					*Thicknesses perpendicular to dip.*				
1.	Surface,	41'	0"	to	41'	0'	28'	9"	to	28'	9"
2.	Mica sandrock,	4'	0"	to	45'	0"	2'	9"	to	31'	6"
3.	Iron ore,		2"	to	45'	2"		2"	to	31'	8"
4.	Gray slate,	25'	5"	to	70'	7"	17'	10"	to	49'	6"
5.	COAL with slate,	12'	9¾"	to	83'	4¾"	8'	11"	to	58'	5"
6.	Gray slate,	11'	10"	to	95'	2¾"	8'	4"	to	66'	9"
7.	Dark sandstone,	18'	2½"	to	113'	5¼"	12'	9"	to	79'	6"
8.	Black slate,	6'	3"	to	119'	8¼"	4'	5"	to	83'	11"
9.	COAL, shelly,		9"	to	120'	5¼"		6"	to	84'	5"
10.	Black slate,	12'	1½"	to	132'	6¾"	8'	5"	to	92'	10"
11.	Dark blue rock,	49'	6"	to	182'	0¾"	34'	9"	to	127'	7"
12.	Fine pebble rock,	16'	7"	to	198'	7¾"	11'	7"	to	139'	2"
13.	Black slate,	1'	4"	to	199'	11¾"	1'	0"	to	140'	2"
14.	COAL bed,	9'	10"	to	209'	9¾"	6'	11"	to	147'	1'
15.	Black slate,	9'	11¼"	to	219'	9"	6'	11"	to	154'	0"
16.	COAL,	2'	6"	to	222'	3"	1'	9"	to	155'	9"
17.	Slate with COAL,	11'	1"	to	233'	4"	7'	10"	to	163'	7"
18.	Blue rock,	14'	0"	to	247'	4"	9'	9"	to	173'	4"
19.	Black slate with coal,	10'	7"	to	257'	11"	7'	5"	to	180'	9"

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
20.	Fine pebble rock, .	41′ 6″ to 299′ 5″	29′ 1″ to 209 10″
21.	COAL with slate, .	7′ 6″ to 306′ 11″	5′ 3″ to 215′ 1″
22.	Black slate, . . .	5′ 8″ to 312′ 7″	4′ 0″ to 219′ 1″
23.	Fine dark sandrock, ...	6′ 6½″ to 319′ 1½″	4′ 6″ to 223′ 7″
24.	COAL with slate, .	2′ 0½″ to 321′ 2″	1′ 6″ to 225′ 1″
25.	Black slate with COAL, ...	15′ 3½″ to 336′ 5½″	10′ 9″ to 235′ 10″
26.	Conglomerate, . .	3′ 0″ to 339′ 5½″	2′ 1″ to 237′ 11″

See Columnar Section Sheet No. III and Mine Sheet No. I, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 21, at Hazleton slope No. 4, third lift.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
1.	MAMMOTH BED, ...	25′ 0″ to 25′ 0″
2.	Sandstone, ...	33′ 2″ to 58′ 2″
3.	Bony COAL, PARLOR BED, ...	3″ to 58′ 5″
4.	Sandstone, ...	6′ 9″ to 65′ 2″
5.	Slate, ...	7″ to 65′ 9″
6.	WHARTON BED, ...	10′ 0″ to 75′ 9″
7.	Slate, ...	22′ 2″ to 97′ 11″
8.	Sandstone, ...	53′ 0″ to 150′ 11″
9.	Slate, ...	33′ 5″ to 184′ 4″
10.	COAL, ...	3′ 6″ to 187′ 10″
11.	Slate, ...	41′ 11″ to 229′ 9″
12.	BUCK MOUNTAIN BED, ...	6′ 0″ to 235′ 9″
13.	Slate, ...	42′ 10″ to 278′ 7″
14.	Coarse sandstone, ...	32′ 4″ to 310′ 11″
15.	Sandstone, ...	57′ 9″ to 368′ 8″
16.	Slate, ...	1′ 0″ to 369′ 8″
17.	Fine sandstone, ...	1′ 8″ to 371′ 4″
18.	Fine conglomerate, ...	24′ 0″ to 395′ 4″
19.	ALPHA BED, ...	1 2″ to 396 6″
20.	Slate, ...	2′ 10″ to 399′ 4″
21.	Sandstone, ...	46′ 7″ to 445′ 11″
22.	Slate, ...	2′ 10″ to 448′ 9″
23.	Fine sandstone, ...	9′ 0″ to 457′ 9″
24.	Conglomerate, ...	38′ 8″ to 496′ 5″
25.	Green sandstone, ...	4′ 9″ to 501′ 2″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 34, at South Sugar Loaf colliery, about 150' west of slope, driven horizontally southward from 1st lift.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Slate, (Dip 52° S.)	2" to 2"	2" to 2"
2.	MAMMOTH COAL BED, ...	6' 9' to 6' 11"	5' 4" to 5' 6"
3.	Slate, ...	1' 2" to 8' 1"	11" to 6' 5"
4.	Sandstone, . . .	11' 6" to 19' 7"	9' 1" to 15' 6"
5.	Fine gray rock, .	10' 6" to 30' 1"	8' 4" to 23' 10"
6.	Slate, ...	1' 1" to 31' 2"	10" to 24' 8"
7.	COAL, ...	10" to 32' 0"	8" to 25' 4"
8.	Sandy slate, . . .	8' 9" to 40' 9"	6' 11" to 32' 3"
9.	Fine gray rock,	7' 6" to 48' 3"	5' 11" to 38' 2"
10.	Slate, ...	7" to 48' 10"	5" to 38' 7"
11.	Fine conglomerate, ...	4' 8" to 53' 6"	3' 8" to 42' 3"
12.	WHARTON BED, .	10' 6" to 64' 0"	8' 4" to 50' 7"
13.	Sandy slate, . . .	10' 0" to 74' 0"	7' 11" to 58' 6"
14.	Fine gray rock, .	19' 11" to 93' 11"	15' 9" to 74' 3"
15.	Sandstone, . . .	26' 11" to 120' 10"	21' 3" to 95' 6'
16.	Fine gray rock, .	18' 6" to 139' 4"	14' 9" to 110' 2"
17.	COAL,	1' 8" to 141' 0"	1' 4" to 111' 6"
18.	Slate, GAMMA	4' 3" to 145' 3"	3' 4" to 114' 10'
19.	COAL, BED.	1' 5" to 146' 8"	1' 2" to 116' 0"
20.	Slate,	4' 6" to 151' 2"	3' 7" to 119' 7"
21.	COAL,	2' 3" to 153' 5"	1' 9" to 121' 4"
22.	Sandy slate, . . .	8' 0" to 161' 5"	6' 4" to 127' 8"
23.	Sandstone, . . .	37' 11" to 199' 4"	29' 11" to 157' 7"
24.	Fine hard conglomerate, . . .	20' 7" to 219' 11"	16' 3" to 173' 10"
25.	COAL, ...	7" to 220' 6"	5" to 174' 3"
26.	Sandstone, . . .	2' 2' to 222' 8"	1' 8" to 175' 11"
27.	Fine conglomerate, ...	11' 8" to 234' 4"	9' 3" to 185' 2"
28.	COAL, ...	3" to 234' 7"	2" to 185' 4"
29.	Fine gray rock, .	4' 8" to 239' 3"	3' 8" to 189' 0"
30.	Sandy slate, . . .	14' 2" to 253' 5"	11' 2" to 200' 2"
31.	COAL, shelly, . .	2' 5' to 255' 10"	1' 11" to 202' 1"
32.	Sandy slate, . . .	5' 0" to 261' 7"	4' 7" to 206' 8"
33.	Gray rock, . . .	30' 3" to 291' 10"	23' 11" to 230' 7"
34.	COAL, ...	1" to 291' 11"	1" to 230' 8"
35.	Conglomerate, .	8' 4" to 300' 3"	6' 7" to 237' 3"
36.	Gray mica rock (Dip 72°), . . .	23' 0" to 323' 3"	18' 2" to 255' 5"
37.	Hard gray rock, .	3' 7" to 326' 10"	2' 10" to 258' 3"
38.	COAL, ...	8" to 327' 6"	6" to 258' 9"

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
39.	Slate.	7′ 6″ to 335′ 0″	5′ 11″ to 264′ 8″
40.	Gray rock,	17′ 0″ to 352′ 0″	13′ 5′ to 278′ 1″
41.	Fine conglomerate,	28′ 8″ to 380′ 8″	22′ 8″ to 300′ 9″
42.	Fine gray rock,	10′ 0″ to 390′ 8″	7′ 11″ to 308′ 8″
43.	Fine conglomerate,	6′ 10″ to 397′ 6″	5′ 5″ to 314′ 1″
44.	Sandstone,	7′ 9″ to 405′ 3″	6′ 1″ to 320′ 2″
45.	Fine gray spar rock,	21′ 2″ to 426′ 5″	16′ 9″ to 336′ 11″
46.	Slate,	1′ 0″ to 427′ 5″	9″ to 337′ 8″
47.	Fine conglomerate,	16′ 2″ to 443′ 7″	12′ 9′ to 350′ 5″
48.	Gray rock,	4′ 7″ to 448′ 2″	3′ 7″ to 354′ 0″
49.	Conglomerate,	14′ 7″ to 462′ 9″	11′ 6″ to 365′ 6″
50.	Gray rock,	2′ 0″ to 464′ 9″	1′ 7″ to 367′ 1″
51.	Slate,	7″ to 465′ 4″	6″ to 367′ 7″
52.	Coarse conglomerate,	80′ 1″ to 545′ 5″	63′ 3″ to 430′ 10″
53.	Gray rock,	1′ 6″ to 546′ 11″	1′ 2″ to 432′ 0″
54.	Coarse conglomerate,	15′ 6″ to 562′ 5″	12′ 3″ to 444′ 3″
55.	Fine blue rock,	6′ 0″ to 568′ 5″	4′ 9″ to 449′ 0″
56.	Coarse conglomerate,	20′ 0″ to 588′ 5″	15′ 10″ to 464′ 10″
57.	Gray rock,	2′ 6″ to 590′ 11″	2′ 0″ to 466′ 10″
58.	Fine conglomerate,	18′ 6″ to 609′ 5″	14′ 7″ to 481′ 5″
59.	Fine blue rock,	2′ 0″ to 611′ 5″	1′ 7″ to 483′ 0″
60.	Coarse gray rock,	12′ 0″ to 623′ 5″	9′ 6″ to 492′ 6″
61.	Green sandstone,	1′ 0″ to 624′ 5″	10″ to 493′ 4″

See Columnar Section Sheet No. III, and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 40, at Hazleton slope No. 3, driven horizontally northward from west gangway A, 6th lift.

Hazleton basin.

No. of strata.	Description. (Dip 50° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	MAMMOTH BED.	——— ———	——— ———
2.	Sandy slate,	14′ 0″ to 14′ 0″	10′ 9″ to 10′ 9″
3.	Sandstone,	3′ 0″ to 17′ 0″	2′ 3″ to 13′ 0″
4.	Fine conglomerate,	23′ 2″ to 40′ 2″	17′ 10″ to 30′ 10″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
5.	Fine gray rock, . .	5′ 0″ to 45′ 2″	3′ 11″ to 34′ 9″
6.	Fine conglomerate,	2′ 0″ to 47′ 2″	1′ 6″ to 36′ 3″
7.	Fine gray rock, . .	3′ 8″ to 50′ 10″	2′ 8″ to 38′ 11″
8.	WHARTON BED, .	10′ 6″ to 61′ 4″	8′ 0′ to 46′ 11″
9.	Sandy slate, . . .	6′ 6″ to 67′ 10″	5′ 0″ to 51′ 11″
10.	Sandstone, ...	16′ 0″ to 83′ 10″	12′ 3″ to 64 2″
11.	Slate with seams of COAL, ...	2′ 7″ to 86′ 5″	2′ 0″ to 66′ 2″
12.	Sandstone, ...	8′ 0″ to 94′ 5″	6′ 1″ to 72′ 3″
13.	Fine gray rock, . .	19′ 3″ to 113′ 8″	14′ 9″ to 87′ 0″
14.	Slate, ...	3′ 2″ to 116′ 10″	2′ 5″ to 89′ 5″
15.	COAL, ...	2′ 4″ to 119′ 2″	1′ 10″ to 91′ 3″
16.	Sandy slate, ...	4′ 10″ to 124′ 0″	3′ 8″ to 94′ 11″
17.	Gray rock, ...	8′ 5″ to 132′ 5″	6′ 6″ to 101′ 5″
18.	Sandy slate, ...	23′ 0″ to 155′ 5″	17′ 7″ to 119′ 0″
19.	Gray rock with spar, ...	10′ 7″ to 166′ 0″	8′ 2′ to 127′ 2″
20.	Sandstone, ...	2′ 0″ to 168′ 0″	1′ 6″ to 128′ 8″
21.	Fine conglomerate,	30′ 4″ to 198′ 4″	23′ 2″ to 151′ 10″
22.	BUCK MOUNTAIN BED, ...	9′ 6″ to 207′ 10″	7′ 4″ to 159′ 2″
23.	Slate, ...	1′ 2″ to 209′ 0″	10″ to 160′ 0″
24.	Fine gray rock, . .	17′ 8″ to 226′ 8″	13′ 7″ to 173′ 7″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 3, 575′± east of Hazleton slope No. 3, driven horizontally southward from 2d lift.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Gray rock, ...	1′ 8″ to 1′ 8′	1′ 5″ to 1′ 5″
2.	Slate, ...	10′ 5″ to 12′ 1″	8′ 9″ to 10′ 2″
3.	COAL, ...	5′ 2″ to 17′ 3″	4′ 4″ to 14′ 6″
4.	Slate, ...	1′ 0″ to 18′ 3″	10″ to 15′ 4″
5.	COAL, ...	1′ 3″ to 19′ 6″	1′ 1″ to 16′ 5″
6.	Slate, ...	2′ 4″ to 21′ 10″	2′ 0″ to 18′ 5″
7.	Blue rock, ...	16′ 0″ to 37′ 10″	13′ 5″ to 31′ 10″
8.	Conglomerate, . .	21′ 4″ to 59′ 2″	17′ 11″ to 49 9″
9.	Gray rock, ...	53′ 5″ to 112′ 7″	44′ 10″ to 94′ 7″
10.	Blue rock, ...	21′ 5″ to 134′ 0″	18′ 0″ to 112′ 7″
11.	Slate, ...	2′ 11″ to 136′ 11″	2′ 5″ to 115′ 0″
12.	Blue rock, ...	10′ 0″ to 146′ 11″	8′ 5″ to 123′ 5″
13.	Slate, ...	24′ 2″ to 171′ 1″	20′ 4″ to 143′ 9″
14.	MAMMOTH BED.	—— ——	—— ——

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 2, at Hazleton slope No. 3, driven horizontally southward from 2d lift, about 150′ east of slope.

Hazleton basin.

No. of strata.	*Description.* (Dip 33° S.)	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Soft sandrock, . . .	13′ 7″ to 13′ 7″	11′ 5″ to 11′ 5″
2.	Slate, ...	9′ 6″ to 23′ 1″	8′ 0″ to 19′ 5″
3.	Coal, ...	1′ 6″ to 24′ 7″	1′ 3″ to 20′ 8″
4.	Slate, ...	8″ to 25′ 3″	7″ to 21′ 3″
5.	Coal, ...	1′ 0″ to 26′ 3′	10″ to 22′ 1″
6.	Slate with coal, . .	2′ 6″ to 28′ 9″	2′ 1″ to 24′ 2″
7.	Slate with bony coal, ...	4′ 6″ to 33′ 3″	3′ 10″ to 28′ 0″
8.	Coal, ...	2′ 3″ to 35′ 6″	1′ 11″ to 29′ 11″
9.	Slate, ...	5″ to 35′ 11″	4″ to 30′ 3″
10.	Blue rock, ...	3′ 6″ to 39′ 5″	3′ 0″ to 33′ 3″
11.	Gray rock, ...	55′ 0″ to 94′ 5″	46′ 2″ to 79′ 5″
12.	Conglomerate, . . .	4′ 5″ to 98′ 10″	3′ 9″ to 83′ 2″
13.	Coal, ...	5′ 4″ to 104′ 2″	4′ 9″ to 87′ 11″
14.	Slate, ...	3′ 4″ to 107′ 6″	2′ 10″ to 90′ 9″
15.	Blue rock, ...	5′ 0″ to 112′ 6″	4′ 2″ to 94′ 11″
16.	Conglomerate, . . .	19′ 6″ to 132′ 0″	16′ 5″ to 111′ 4″
17.	Gray rock, ...	11′ 0″ to 143′ 0″	9′ 3″ to 120′ 7″
18.	Slate, ...	1′ 3″ to 144′ 3″	1′ 1″ to 121′ 8″
19.	Coal, ...	5″ to 144′ 8″	4″ to 122′ 0′
20.	Slate, ...	4″ to 145′ 0″	3″ to 122′ 3″
21.	Coal, ...	1′ 0″ to 146′ 0″	10″ to 123′ 1″
22.	Slate, ...	3″ to 146′ 3″	3″ to 123′ 4″
23.	Gray rock, ...	36′ 11″ to 183′ 2″	31′ 0′ to 154′ 4″
24.	Conglomerate, . . .	5′ 4″ to 188′ 6″	4′ 6″ to 158′ 10″
25.	Gray rock, ...	10′ 6″ to 199′ 0″	8′ 10″ to 167′ 8″
26.	Conglomerate, . . .	5″ to 199′ 5″	4″ to 168′ 0″
27.	Gray rock, ...	20′ 6″ to 219′ 11″	17′ 3″ to 185′ 3″
28.	Coal, ...	5′ 0″ to 224′ 11″	4′ 2″ to 189′ 5″
29.	Slate, ...	6″ to 225′ 5″	5″ to 189′ 10″
30.	Coal, ...	3′ 10″ to 229 3″	3′ 3″ to 193′ 1″
31.	Slate, ...	14′ 8½″ to 243′ 11½″	12′ 5″ to 205′ 6″
32.	Conglomerate, . . .	24 5½″ to 268′ 5″	20′ 6″ to 226′ 0″
33.	Gray rock, ...	56′ 0″ to 324′ 5″	47′ 0″ to 273′ 0″
34.	Blue rock, ...	6′ 7″ to 331′ 0″	5′ 7″ to 278′ 7″
35.	Gray rock, ...	3′ 0″ to 334′ 0″	2′ 6″ to 281′ 1″
36.	Blue rock, ...	2′ 1″ to 336′ 1″	1′ 9″ to 282′ 10″
37.	Gray rock, ...	7′ 3″ to 343′ 4″	6′ 1″ to 288′ 11″
38.	Blue rock, ...	9′ 10″ to 353′ 2″	8′ 3″ to 297′ 2″
39.	Slate, ...	15′ 0″ to 368′ 2″	12′ 7″ to 309′ 9″
40.	Coal, ...	4″ to 368′ 6″	3″ to 310′ 0″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
41.	Slate, ...	3' 8'' to 372' 2''	3' 1'' to 312' 1''
42.	COAL, ...	5'' to 372' 7''	4'' to 313' 5''
43.	Slate, ...	30' 11'' to 403' 6''	26' 0'' to 339' 5''
44.	MAMMOTH BED.	——— ———	——— ———

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 4, at Hazleton slope No. 3, driven horizontally southward from 2d lift 475' west of slope.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Gray rock, ...	6' 0'' to 6' 0''	5'' to 5''
2.	COAL, good, ...	4' 2'' to 10' 2''	3' 6'' to 3' 11''
3.	Bone and slate, . . .	6'' to 10' 8''	5'' to 4' 4''
4.	COAL, shelly, . . .	2' 8'' to 13' 4''	2' 3'' to 6' 7''
5.	Slate, ...	1' 0'' to 14'. 4''	10'' to 7' 5''
6.	Blue rock, ...	13' 5'' to 27' 9''	11' 3'' to 18' 8''
7.	Gray rock, ...	9' 3'' to 37' 0''	7' 9'' to 26' 5''
8.	Conglomerate, . . .	12' 5'' to 49' 5''	10' 5'' to 36' 10''
9.	Blue rock, ...	3' 9'' to 53' 2''	3' 2'' to 40' 0''
10.	Gray rock, ...	24' 1'' to 77' 3''	20' 3'' to 60' 3''
11.	Blue rock, ...	40' 3'' to 117' 6''	33' 10'' to 94' 1''
12.	Gray rock, ...	4' 6'' to 122' 0''	3' 9'' to 97' 10''
13.	Blue rock, ...	6' 6'' to 128' 6''	5' 6'' to 103' 4''
14.	Gray rock, ...	17' 5'' to 145' 11''	14' 8' to 118' 0''
15.	Blue rock, hard, . .	20' 0'' to 165' 11''	16' 11'' to 134' 11''
16.	Gray rock, ...	42' 5'' to 208' 4''	35' 8'' to 170' 7''
17.	Clod, shelly, ...	3' 0'' to 211' 4''	2' 6'' to 173' 1''
18.	MAMMOTH BED.	——— ———	——— ———

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole, Hazleton slope No. 1, at boilers 1600'± south-west of L. V. R. R. station.

Hazleton basin.

No. of strata.	*Description.* (Dip about 35° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Conductor, ...	29' 0'' to 29' 0''	29' 0'' to 29' 0''
2.	Soft sandstone, . . .	62' 0'' to 91' 0''	51' 0'' to 80' 0''

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
3.	Slate with streaks of COAL, ...	3′ 0″ to 94′ 0″	2′ 6″ to 82′ 6″
4.	Sandstone, ...	16′ 0″ to 110′ 0″	13′ 2″ to 95′ 8″
5.	Slate, ...	4′ 0″ to 114′ 0″	8′ 3″ to 98′ 11″
6.	Slate with a little COAL, ...	2′ 6″ to 116′ 6″	2′ 0″ to 100′ 11″
7.	Dark sandstone and COAL, . . .	23′ 6″ to 140′ 0″	19′ 3″ to 120′ 2″
8.	Slate, ...	1′ 6″ to 141′ 6″	1′ 3″ to 121′ 5″
9.	COAL, ...	1′ 0″ to 142′ 6′	10″ to 122′ 3″
10.	Hard sandstone, . .	5′ 0″ to 147′ 6″	4′ 1″ to 126′ 4″
11.	Soft sandstone, . . .	38′ 6″ to 186′ 0″	31′ 7″ to 157′ 11″
12.	Soft sandstone, . . .	13′ 6″ to 199′ 6″	11′ 1″ to 169′ 0″
13.	Slate, ...	13′ 0″ to 212′ 6″	10′ 8″ to 179′ 8″
14.	Slate, ...	11′ 0″ to 223′ 6″	9′ 0″ to 188′ 8″
15.	COAL, rough, . . .	5′ 0″ to 228′ 6″	4′ 1″ to 192′ 9″
16.	Slate, ...	18′ 0″ to 246′ 6″	14′ 9″ to 207′ 6″
17.	Sandstone, ...	7′ 6″ to 254′ 0″	6′ 2″ to 213′ 8″
18.	Sandstone, ...	52′ 0″ to 306′ 0″	42′ 9″ to 256′ 5″
19.	Sandstone, ...	18′ 0″ to 324′ 0′	14′ 9″ to 271′ 2″
20.	Sandstone, hard, . .	139′ 0″ to 463′ 0″	114′ 2″ to 385′ 4″
21.	MAMMOTH BED.	——— ———	——— ———

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 31, at Crystal Ridge colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 9° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	13′ 0″ to 13′ 0″	12′ 10″ to 12′ 10″
2.	Sandstone, ...	41′ 8″ to 54′ 8″	41′ 2″ to 54′ 0″
3.	COAL BED, ...	3′ 10″ to 58′ 6″	3′ 9′ to 57′ 9″
4.	Slate, ...	5′ 8″ to 64′ 2″	5′ 7″ to 63′ 4″
5.	COAL, ...	1′ 3″ to 65′ 5″	1′ 2″ to 64′ 6′
6.	Slate, ...	3′ 1″ to 68′ 6″	3′ 1″ to 67′ 7″
7.	Conglomerate, . . .	17′ 7″ to 86′ 1″	17′ 5″ to 85′ 0″
8.	Slate, ...	2′ 2″ to 88′ 3″	2′ 2″ to 87′ 2″
9.	Sandstone, ...	12′ 10″ to 101′ 1″	12′ 8″ to 99′ 10″
10.	Slate, ...	1′ 2″ to 102′ 3″	1′ 2″ to 101′ 0″
11.	MAMMOTH BED, . .	31′ 2″ to 133′ 5″	30′ 9′ to 131′ 9″
12.	Sandstone, ...	4′ 11″ to 138′ 4″	4′ 10″ to 136′ 7″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 33, at Crystal Ridge colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 9° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	17′ 9″ to 17′ 9″	17′ 6″ to 17′ 6″
2.	Shelly COAL and slate, ...	1′ 10″ to 19′ 7″	1′ 10″ to 19′ 4″
3.	Sandstone, ...	12′ 4″ to 31′ 11″	12′ 2″ to 31′ 6″
4.	Shelly COAL and slate, ...	3′ 1″ to 35′ 0″	3′ 0″ to 34′ 6″
5.	Slate, ...	2′ 11″ to 37′ 11″	2′ 11″ to 37′ 5″
6.	Conglomerate, . . .	14′ 10″ to 52′ 9″	14′ 8″ to 52′ 1″
7.	Sandstone, ...	12′ 4″ to 65′ 1″	12′ 2″ to 64′ 3″
8.	Slate, ...	1′ 0″ to 66′ 1″	1′ 0″ to 65′ 3″
9.	COAL, } MAMMOTH BED (Dip 40° N).	13′ 8″ to 79′ 9″	13′ 6″ to 78′ 9″
10.	Slate,	11″ to 80′ 8″	11″ to 79′ 8″
11.	COAL,	8′ 3″ to 88′ 11″	8′ 2″ to 87 10″
12.	Slate,	11″ to 89′ 10″	10″ to 88′ 8″
13.	COAL,	6′ 6″ to 96′ 4″	6′ 5″ to 95′ 1″
14.	Sandstone, ...	1′ 0″ to 97′ 4″	1′ 0″ to 96′ 1″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole put down at head of reservoir on Hazle Creek, south of Hazleton shops.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	Surface, ...	10′ 6″ to 10′ 6″
2.	Conglomerate, ...	137′ 6″ to 148′ 0″
3.	Dark sandstone, ...	1′ 0″ to 149′ 0″
4.	Green sandstone, ...	25′ 0″ to 174′ 0″
5.	Conglomerate, ...	28′ 6″ to 202′ 6″
6.	Sandstone, ...	3′ 0″ to 205′ 6″
7.	Green shale, ...	21′ 6″ to 227′ 0″
8.	Conglomerate, ...	33′ 0″ to 260′ 0″
9.	Sandstone, ...	5′ 6″ to 265′ 6″
10.	Conglomerate, ...	17′ 0″ to 282′ 6″
11.	Sandstone, ...	35′ 6″ to 318′ 0″
12.	Red shale, ...	20′ 0″ to 338′ 0″
13.	Sandstone, ...	17′ 0″ to 355′ 0″
14.	Conglomerate, ...	34′ 0″ to 389′ 0″
15.	Sandstone, ...	8′ 0″ to 397′ 0″
16.	Red shale, ...	1′ 0″ to 398′ 0″
17.	Sandstone, ...	18′ 0″ to 416′ 0″

No. of strata.	*Description.*	*Thicknesses measured vertically.*
18.	Conglomerate,	15′ 0″ to 431′ 0″
19.	Sandstone,	8′ 0″ to 439′ 0″
20.	Red shale,	11′ 0″ to 450′ 0″
21.	Conglomerate,	59′ 0″ to 509′ 0″
22.	Sandstone,	3′ 0″ to 512′ 0″
23.	Red shale,	29′ 0″ to 541′ 0″
24.	Sandstone,	14′ 0″ to 555′ 0″
25.	Quartz,	10′ 0″ to 565′ 0″

See Columnar Section Sheet No. III, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 38. at Hazleton slope No. 3, driven horizontally southward from west gangway B, 6th lift.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*
1.	Sand slate,	16′ 0″ to 16′ 0″
2.	Sandstone,	15′ 0″ to 31′ 0″
3.	Sand slate,	4′ 0″ to 35′ 0″
4.	Sandstone,	23′ 0″ to 58′ 0″
5.	Slate,	4′ 0″ to 62′ 0″
6.	Slate and bone,	7″ to 62′ 7″
7.	Slate,	6′ 1″ to 68′ 8″
8.	COAL dirt,	4′ 6″ to 73′ 2″
9.	Slate,	8″ to 73′ 10″
10.	Fine conglomerate,	33′ 4″ to 107′ 2″
11.	Fine blue rock with spar,	6′ 8″ to 113 10″
12.	COAL, soft and shelly,	5′ 5″ to 119′ 3″
13.	Coarse conglomerate,	17′ 0″ to 136′ 3″
14.	Gray rock,	2′ 0″ to 138′ 3″
15.	Fine conglomerate,	3′ 6″ to 141′ 9″
16.	Dark sand rock,	11′ 4″ to 153′ 1″
17.	Fine conglomerate,	1′ 8″ to 154′ 9″
18.	Dark sand rock,	4′ 0″ to 158′ 9″
19.	Fine blue rock,	15′ 1″ to 173′ 10″
20.	MAMMOTH BED,	49′ 4″ to 223′ 2″
21.	Coarse conglomerate,	11′ 9″ to 234′ 11″
22.	Fine conglomerate,	20′ 7″ to 255′ 6″
23.	Coarse conglomerate,	2′ 1″ to 257′ 7″
24.	Fine blue-rock,	1′ 0″ te 258′ 7″
25.	Fine conglomerate,	9′ 0″ to 267′ 7″
26.	Fine gray rock,	8′ 0″ to 275′ 7″
27.	Fine conglomerate,	28′ 4″ to 303′ 11″
28.	Gray rock,	5′ 2″ to 309′ 1″
29.	Sand slate,	16′ 8″ to 325′ 9″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*
30.	COAL,	3' 2" to 328' 11"
31.	Bony slate,	1' 3" to 330' 2"
32.	Slate,	21' 8" to 351' 10"
33.	COAL BED,	6' 5" to 358' 3"
34.	Slate,	7' 0" to 365' 3"
35.	Slate with COAL seams,	3' 0" to 368' 3"
36.	Slate,	4' 0" to 372' 3"
37.	Sand slate,	23' 8" to 395' 11"
38.	Fine gray rock,	22' 0" to 417' 11"
39.	Sandstone,	3' 0" to 420' 11"
40.	COAL, bony,	10" to 421' 9"
41.	Slate,	21' 3" to 443' 0"
42.	COAL BED,	74' 11" to 517' 11"
43.	Slate,	2' 0" to 519' 11"
44.	Light gray rock,	54' 6" to 574' 5"

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 39, at Hazleton slope No. 3, driven horizontally southward from below 5th lift.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*
1.	Sand slate,	59' 10" to 59' 10"
2.	Fine gray rock,	30' 3" to 90' 1'
3.	Sandstone,	36' 10" to 126' 11"
4.	Fine gray rock,	2' 0" to 128' 11"
5.	Fine blue rock,	13' 6" to 142' 5"
6.	Sand slate,	76' 7" to 219' 0"
7.	Slate,	1' 0" to 220' 0"
8.	COAL,	5' 10" to 225' 10"
9.	Slate with seams of bony COAL,	15' 0" to 240' 10"
10.	Black slate,	6' 0" to 246 10"
11.	Slate with seams of bony COAL,	10' 0" to 256' 10"
12.	Slate,	23' 2" to 280' 0"
13.	Sand slate,	113' 0" to 393' 0"
14.	Slate,	10' 3" to 403' 3"
15.	COAL, bony,	1' 9" to 405' 0"
16.	Slate,	6' 6" to 411' 6"
17.	COAL BED,	27' 8" to 439' 2"
18.	Gray rock,	3' 0" to 442' 2"

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 19, at Hazleton slope, No. 6 colliery, 670′± east of slope.

Hazleton basin.

No. of strata.	*Description.* (Dip 28° N.)		*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...		16′ 0″ to 16′ 0″	14′ 2″ to 14′ 2″
2.	Light gray sandstone, ...		7′ 9″ to 23′ 9″	6′ 9″ to 20′ 11″
3.	Slate, ...		2′ 6″ to 26′ 3″	2′ 3″ to 23′ 2″
4.	Light gray sandstone, ...		45 1″ to 71′ 4″	39′ 10″ to 63′ 0″
5.	Clod and slate, .		3′ 6″ to 74′ 10″	3′ 1″ to 66′ 1″
6.	MAMMOTH BED,		34 8″ to 109′ 6″	30′ 7″ to 96′ 8″
7.	Light gray sandstone, ...		58 11″ to 168′ 5″	51′ 11″ to 148′ 7″
8.	COAL PARLOR BED, ...		5″ to 168′ 10″	5″ to 149′ 0″
9.	Slate, ...		3′ 2″ to 172′ 0″	2′ 10″ to 151′ 10″
10.	Fine sandstone, .		35′ 11″ to 207′ 11″	31′ 8″ to 183′ 6″
11.	Slate, ...		2′ 6″ to 210′ 5″	2′ 3″ to 185′ 9′
12.	COAL, . . .	WHARTON BED.	6″ to 210′ 11″	5″ to 186′ 2″
13.	Slate, . . .		4′ 0″ to 214′ 11″	3′ 6″ to 189′ 8″
14.	COAL, . .		5′ 5″ to 220′ 4″	4′ 10″ to 194′ 6″
15.	Slate, ...		19′ 7″ to 239′ 11″	17′ 4″ to 211′ 10″
16.	Sandstone, . . .		8′ 8″ to 248′ 7″	7′ 8″ to 219′ 6″
17.	Slate, ...		2′ 1″ to 250 8″	1′ 10″ to 221′ 4″
18.	COAL, . . .	GAMMA BED.	6″ to 251′ 2″	5″ to 221′ 9″
19.	Slate, ...		1′ 3″ to 252′ 5″	1′ 1″ to 222′ 10″
20.	COAL, . . .		3′ 2″ to 255′ 7″	2′ 10″ to 225′ 8″
21.	Slate, ...		6′ 0″ to 261′ 7″	5′ 3′ to 230′ 11″
22.	Sandstone, . . .		1′ 6″ to 263′ 1″	1′ 5″ to 232′ 4″
23.	Slate, ...		5′ 9″ to 268′ 10″	5′ 0″ to 237′ 4″
24.	COAL, ...		1′ 6″ to 270′ 4″	1′ 5″ to 238′ 9″
25.	Slate, ...		12′ 2″ to 282′ 6″	10′ 8″ to 249′ 5″
26.	Fine sandstone, .		17′ 2″ to 299′ 8″	15′ 2″ to 264′ 7″
27.	Coarse sandstone,		7′ 7″ to 307′ 3″	6′ 8″ to 271′ 3″
28.	Fine sandstone, .		3′ 1″ to 310′ 4″	2′ 9″ to 274′ 0″
29.	Coarse sandstone,		25′ 4″ to 335′ 8″	22′ 4″ to 296′ 4″
30.	Slate, ...		10″ to 336′ 6″	9″ to 297′ 1″
31.	BUCK MOUNTAIN BED, ...		8′ 10″ to 345′ 4″	7′ 10′ to 304′ 11″
32.	Slate, ...		5′ 1″ to 350′ 5″	4′ 5″ to 309′ 4″
33.	Fine sandstone, .		20′ 0″ to 370′ 5″	17′ 8″ to 327′ 0′
34.	Coarse sandstone,		10′ 0″ to 380′ 5″	8′ 10″ to 335′ 10″
35.	Fine sandstone, .		2′ 4″ to 382′ 9″	2′ 1″ to 337 11′

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
36.	Coarse sandstone,	10′ 7″ to 393′ 4″	9′ 4″ to 347′ 3″
37.	Sandstone and slate, ...	4′ 9″ to 398′ 1″	4′ 2″ to 351′ 5″
38.	Sandstone, . . .	58′ 2″ to 456′ 3″	51′ 5″ to 402′ 10″
39.	Slate, ...	2′ 2″ to 458′ 5″	1′ 11″ to 404′ 9″
40.	Coarse sandstone,	2′ 0″ to 460′ 5″	1′ 9″ to 406′ 6″
41.	Fine sandstone, .	2′ 2″ to 462′ 7″	1′ 11″ to 408′ 5″
42.	Conglomerate, .	1′ 6″ to 464′ 1″	1′ 4″ to 409′ 9″
43.	Slate, ...	2′ 6″ to 466′ 7″	2′ 2″ to 311′ 11″
44.	Sandstone, . . .	9′ 4″ to 475′ 11″	8′ 3″ to 420′ 2″
45.	Coarse sandstone,	14′ 0″ to 489′ 11″	12′ 5″ to 432′ 7″
46.	Slate, ...	3′ 0″ to 492 11″	2′ 7″ to 435′ 2″
47.	Conglomerate, .	84′ 4″ to 577′ 3″	74′ 6″ to 509′ 8″
48.	Sandstone, . . .	27′ 11″ to 605′ 2″	24′ 8″ to 534′ 4″
49.	Slate, ...	6′ 0″ to 611′ 2″	5′ 3″ to 539′ 7″
50.	White conglomerate, ...	28′ 0″ to 639′ 2″	24′ 9″ to 564 4″
51.	Green sandstone,	2′ 11″ to 642′ 1″	2′ 6″ to 566′ 10″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 14, at slope No. 6 colliery, 312′ east of slope.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured vertically.*
1.	Surface, ...	10′ 0″ to 10′ 0″
2.	Light gray sandstone, ...	53′ 0″ to 63′ 0″
3.	COAL, ...	10″ to 63′ 10″
4.	Slate, ...	8′ 10″ to 72′ 8′
5.	COAL, bony, ...	1′ 0″ to 73′ 8″
6.	Slate, ...	2′ 0″ to 75′ 8′
7.	Dark fine sandstone, ...	5′ 4″ to 81′ 0″
8.	Coarse sandstone, ...	2′ 0″ to 83′ 0″
9.	Very coarse sandstone, ...	9′ 0″ to 92′ 0″
10.	Slate, ...	3′ 6″ to 95′ 6″
11.	Fine sandstone, ...	12′ 6″ to 108′ 0″
12.	Slate, ...	2′ 8″ to 110′ 8″
13.	MAMMOTH BED, ...	32′ 5″ to 143′ 1″
14.	Slate and bone, ...	5′ 8″ to 148′ 9″
15.	Fine sandstone, ...	16′ 10″ to 165′ 7″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of South Rock tunnel at Cranberry colliery.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED,**	31′ 8″ to 31′ 8″
2.	Sandstone,	78′ 4″ to 110′ 0″
3.	Slate,	2′ 6″ to 112′ 6″
4.	Sandstone,	47′ 4″ to 159′ 10″
5.	Conglomerate,	2′ 0″ to 161′ 10″
6.	Sandstone,	56′ 9″ to 218′ 7″
7.	**PARLOR BED,**	3′ 9″ to 222′ 4″
8.	Sandstone,	8′ 4″ to 230′ 8″
9.	**WHARTON BED,**	5′ 5″ to 236′ 1″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of North Rock tunnel at Cranberry colliery.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED,**	31′ 8″ to 31′ 8″
2.	Sandstone,	80′ 7′ to 112′ 3″
3.	Slate,	2′ 6′ to 114′ 9″
4.	Sandstone,	42′ 10″ to 157′ 7″
5.	Conglomerate,	2′ 0″ to 159′ 7″
6.	Sandstone,	47′ 3″ to 206′ 10″
7.	**PARLOR BED,**	3′ 10″ to 210′ 8″
8.	Sandstone.	29′ 0″ to 239′ 8″
9.	**WHARTON BED,**	7′ 0″ to 246′ 8″

See Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 1. at Humboldt colliery ,1110′ northeast of slope No. 3.

Hazleton basin.

No. of strata.	*Description.* (Dip 50° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface,	5′ 0″ to 5′ 0″	3′ 2″ to 3′ 2″
2.	Sandstone,	33′ 7″ to 38′ 7″	21′ 8″ to 24′ 10″
3.	Sandrock,	14′ 11″ to 53′ 6″	9′ 7″ to 34′ 5″
4.	Slate and **COAL,**	1′ 3″ to 54′ 9″	8″ to 35′ 1″
5.	Sandstone,	3′ 7″ to 58′ 4″	2′ 5″ to 37′ 6″
6.	Slate,	1′ 7″ to 59′ 11″	1′ 0″ to 38′ 6″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
7.	Slate and COAL, . .	7′ 9″ to 67′ 8″	5′ 0″ to 43′ 6 ′
8.	Slate, ...	2′ 0″ to 69′ 8″	1′ 3″ to 44′ 9″
9.	Fine conglomerate,	2′ 4″ to 72′ 0″	1′ 6″ to 46′ 3″
10.	Sandstone, ...	5′ 0″ to 77′ 0″	3′ 3″ to 49′ 6″
11.	Blue rock, ...	25′ 6 ′ to 102′ 6″	16′ 4″ to 65′ 10″
12.	Sandstone, ...	7′ 3″ to 109′ 9′	4′ 8″ to 70′ 6″
13.	Blue rock, ...	4′ 6″ to 114′ 3′	2′ 9″ to 73′ 3″
14.	Fine conglomerate,	100′ 7″ to 214′ 10″	64′ 10″ to 138′ 1″
15.	Slate, ...	4′ 8″ to 219′ 6″	3′ 0″ to 141′ 1″
16.	PARLOR BED, . . .	12′ 6″ to 232′ 0″	8′ 0″ to 149′ 1″
17.	Slate, ...	39′ 6″ to 271′ 6″	25′ 0″ to 174′ 1″
18.	WHARTON BED, , . .	13′ 5″ to 284′ 11″	9′ 1″ to 183′ 2″
19.	Slate, ...	6′ 0″ to 290′ 11″	3′ 10″ to 187′ 0″
20.	Conglomerate, . . .	39′ 6″ to 330′ 5″	25′ 4″ to 212′ 4″
21.	Slate, ...	6″ to 330′ 11″	4″ to 212′ 8″
22.	GAMMA BED, ...	5′ 8″ to 336′ 7″	3′ 8″ to 216′ 4″
23.	Slate, ...	3′ 11″ to 340′ 6″	2′ 6′ to 218′ 10′
24.	Fine blue conglomerate, ...	28′ 4″ to 368′ 10″	18′ 3″ to 237′ 1″
25.	Sandslate, ...	2′ 10″ to 371′ 8″	1′ 10″ to 238′ 11″
26.	Sandstone, ...	4′ 8″ to 376′ 4″	3′ 0″ to 241′ 11″
27.	COAL and bone, . .	3′ 2″ to 379′ 6″	2′ 0″ to 243′ 11″
28.	Slate, ...	5′ 6″ to 385′ 0″	3′ 7″ to 247′ 6″
29.	COAL, ...	10″ to 385′ 10″	6″ to 248′ 0″
30.	Sandslate, ...	12′ 1″ to 397′ 11″	7′ 9″ to 255′ 9″
31.	Fine conglomerate,	12′ 0″ to 409′ 11″	7′ 9″ to 263′ 6″
32.	COAL, bony, ...	4″ to 410′ 3″	2″ to 263′ 8″
33.	Fine conglomerate,	3′ 10″ to 414′ 1″	2′ 6″ to 266′ 2″
34.	Sandslate, ...	3′ 0″ to 417′ 1″	1′ 11″ to 268′ 1″
35.	Fine conglomerate,	2′ 1″ to 419′ 2″	1′ 4″ to 209′ 5″
36.	Fine and coarse conglomerate, ...	11′ 1″ to 430′ 3″	7′ 2″ to 276′ 7″
37.	Coarse pebbled conglomerate, ...	32′ 2″ to 462′ 5″	20′ 7″ to 297′ 2″
38.	Blue conglomerate,	12′ 1″ to 474′ 6″	7′ 10″ to 305′ 0″
39.	Coarse blue conglomerate, ...	5′ 2″ to 479′ 8″	3′ 4″ to 308′ 4″
40.	Slate, ...	4′ 5″ to 484′ 1″	2′ 10″ to 311′ 2″
41.	Blue conglomerate,	2′ 7″ to 486′ 8″	1′ 8″ to 312′ 10″
42.	Fine blue conglomerate with spar, .	19′ 4″ to 506′ 0″	12′ 4″ to 325′ 2″
43.	Fine blue conglomerate, ...	22′ 3″ to 528′ 3″	14′ 4″ to 339′ 6″
44.	Fine blue conglomerate with spar, .	11′ 11″ to 540′ 2″	7′ 8″ to 347′ 2″
45.	Coarse pebbled black rock, ...	22′ 7″ to 562′ 9″	14′ 6″ to 361′ 8″
46.	Fine blue rock, . .	2′ 6″ to 565′ 3″	1′ 8″ to 363′ 4″
47.	Coarse pebbled and fine conglomerate,	22′ 0″ to 587′ 3″	14′ 1″ to 377′ 5″

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
48.	Fine blue rock, . .	3' 0" to 590' 3"	2' 0" to 379' 5"
49.	Coarse pebbled rock,	12' 0" to 602' 3"	7' 8" to 387' 1"
50.	Blue rock, ...	8" to 602' 11"	6" to 387' 7"
51.	Coarse pebbled conglomerate, ...	25' 7" to 628' 6"	16' 5" to 404' 0"
52.	Hard slate, ...	2" to 628' 8"	1" to 404' 1'
53.	Coarse conglomerate, ...	39' 0" to 667' 8"	25' 4" to 429' 5"
54.	Blue rock, ...	1' 2" to 668' 10"	9" to 430' 2"
55.	Coarse pebbled conglomerate, ...	10' 0" to 678' 10"	6' 5" to 436' 7"
56.	Green sandstone, . .	9' 6" to 688' 4"	6' 1" to 442' 8"

See Columnar Section Sheet No. III, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore hole No. 1, at mouth of Diamond slope No. 1, Sugar Loaf colliery.

Hazleton basin.

No. of strata.	Description. (Dip 29° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	28' 0" to 28' 0"	24' 6" to 24' 6"
2.	Slate and sandy slate, ...	15' 0" to 43' 0"	13' 1" to 37' 7"
3.	COAL, ...	1' 0" to 44 0"	11" to 38' 6"
4.	Slate, ...	5' 0" to 49' 0"	4' 4" to 42' 10"
5.	COAL, slate and dirt,	1' 0" to 50' 0"	11" to 43' 9'
6.	COAL with slate, .	5' 0" to 55' 0"	4' 4" to 48' 1"
7.	Light slate, ...	11' 0" to 66' 0"	9' 8" to 57' 9"
8.	Hard sandstone, . .	18' 0" to 84' 0"	15 9" to 73' 6"
9.	Fine conglomerate,	5' 0" to 89' 0"	4' 4" to 77' 10"
10.	Sandstone, ...	40' 0" to 129' 0"	35' 0" to 112' 10"
11.	Sandy slate, ...	6' 0" to 135' 0"	5' 9" to 118' 7"
12.	Slate and dirt with a little COAL, . . .	23' 0" to 158' 0"	19' 7" to 138' 2"
13.	Sandstone, ...	48' 0" to 206' 0"	42' 0" to 180' 2"
14.	Slate, COAL and dirt,	8' 0" to 214' 0"	7' 0" to 187' 2"
15.	COAL, good, ...	4' 0" to 218' 0"	3' 6" to 190' 8"
16.	Sandstone, ...	15' 0" to 233' 0"	13' 1" to 203' 9"
17.	Coarse sandstone, .	14' 0" to 247' 0"	12' 3" to 216' 0"
18.	Sandstone, ...	33' 0" to 280' 0"	28' 11" to 244' 11"
19.	Conglomerate and coarse sandstone,	36' 0" to 316' 0"	31' 5" to 276' 4"
20.	Conglomerate and coarse sandstone,	24' 0" to 340' 0"	21' 0" to 297' 4"

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
21.	Sandy slate and pure slate, ...	6' 0'' to 346' 0''	5' 3'' to 302' 7''
22.	Fine and coarse sandstone, . . .	18' 0'' to 364' 0''	15' 9'' to 318' 4''
23.	Conglomerate, . .	8' 0'' to 372' 0''	7' 0'' to 325 4''
24.	Sandstone, ...	4' 0'' to 376' 0''	3' 6'' to 328 10''
25.	Sandstone and conglomerate, . . .	5' 0'' to 381' 0''	4' 5'' to 333' 3''
26.	Conglomerate, . .	15' 0'' to 396' 0''	13' 1'' to 346' 4''
27.	Conglomerate and sandstone, . . .	11' 0'' to 407' 0''	9' 8'' to 356' 0''
28.	Conglomerate and sandstone, . . .	8' 0'' to 415' 0''	6' 11'' to 362' 11''
29.	Sandstone, ...	2' 0'' to 417' 0''	1' 9'' to 364' 8''
30.	Conglomerate, . .	8' 0'' to 425' 0''	7' 0'' to 371' 8''
31.	Conglomerate and sandstone, . . .	4' 0'' to 429' 0''	3' 6'' to 375' 2''
32.	Conglomerate and hard sandstone, .	21' 0'' to 450' 0''	18' 5'' to 393' 7''
33.	Sandstone, ...	1' 6'' to 451' 6''	1' 3'' to 394' 10''
34.	Conglomerate, . .	2' 6'' to 454' 0''	2' 3'' to 397' 1''
35.	Sandstone, ...	22' 6'' to 476' 6''	19' 8'' to 416' 9''
36.	Sandstone and conglomerate, . . .	10' 0'' to 486' 6''	8' 9'' to 425' 6''
37.	Sandstone and conglomerate, . . .	2' 0'' to 488' 6''	1' 9'' to 427' 3''
38.	Slate, ...	2' 6'' to 491' 0''	2' 2'' to 429' 5''
39.	Strata, ...	72' 9'' to 563' 9''	63' 8'' to 493' 1''

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 2, at Old Sugar Loaf (Diamond) colliery.

Hazleton basin.

No. of Strata.	Description. (Dip 29° S.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Surface, ...	8' 0'' to 8' 0''	7' 0'' to 7' 0''
2.	Wash and slate, .	5' 2'' to 13' 2''	4' 6'' to 11' 6''
3.	COAL, soft, ...	1' 7'' to 14' 9''	1' 5'' to 12' 11''
4.	Gray slate, ...	4' 9'' to 19' 6''	4' 2'' to 17' 1''
5.	Slate and COAL mixed, ...	6' 0'' to 25' 6''	5' 3'' to 22' 4''
6.	Gray slate, ...	4' 3'' to 29' 9''	3' 8'' to 26' 0''
7.	Gray rock, ...	42' 6' to 72' 3''	37' 2'' to 63' 2''
8.	Slate, ...	6'' to 72' 9''	6'' to 63' 8''
9.	Dark rock, ...	31' 10'' to 104' 7''	27' 10'' to 91' 6''
10.	Slate, ...	2' 2'' to 106' 9''	1' 10'' to 93' 4''

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
11.	COAL, ...	2′ 0″ to 108′ 9″	1′ 9″ to 95′ 1″
12.	Slate, ...	2′ 9″ to 111′ 6″	2′ 5″ to 97′ 6″
13.	Slate and COAL, .	10″ to 112′ 4″	9″ to 98′ 3″
14.	Slate, ...	14′ 7″ to 126′ 11″	12′ 9″ to 111′ 0″
15.	Gray rock, ...	51′ 7″ to 178′ 6″	45′ 1″ to 156′ 1″
16.	Slate, ...	1′ 6″ to 180′ 0″	1′ 4″ to 157′ 5″
17.	COAL, ...	1′ 6″ to 181′ 6″	1′ 4″ to 158′ 9″
18.	COAL and slate, .	2′ 1″ to 183′ 7″	1′ 10″ to 160′ 7″
19.	COAL, ...	1′ 3″ to 184′ 10″	1′ 1″ to 161′ 8″
20.	Slate, ...	11′ 4″ to 196′ 2″	9′ 11″ to 171′ 7″
21.	Gray rock and conglomerate, . . .	113′ 10″ to 310′ 0″	99′ 6″ to 271′ 1″
22.	Slate, ...	1′ 8″ to 311′ 3″	1′ 2″ to 272′ 3″
23.	Rock, ...	3′ 6″ to 314′ 9″	3′ 0″ to 275′ 3″
24.	Slate, ...	2′ 10″ to 317′ 7″	2′ 6″ to 277′ 9″
25.	Rock and slate, .	6′ 1″ to 323′ 8″	5′ 4″ to 283′ 1′
26.	Rock, ...	9′ 5″ to 333′ 1″	8′ 3″ to 291′ 4″
27.	Rock and slate, .	6″ to 333′ 7″	5″ to 291′ 9″
28.	Gray conglomerate, ...	81′ 6″ to 415′ 1″	71′ 3″ to 363′ 0″
29.	Sandy rock, . . .	1′ 0″ to 416′ 1″	11″ to 363′ 11″
30.	White conglomerate, ...	12′ 6″ to 428′ 7″	10′ 11″ to 374′ 10″
31.	Light sandy rock,	20′ 7″ to 449′ 2″	18′ 0″ to 392′ 10″
32.	Slate, ...	8″ to 449′ 10″	7″ to 393′ 5″
33.	Sandy rock, . . .	7′ 6″ to 457′ 4″	6′ 7″ to 400′ 0″
34.	Conglomerate, . .	10′ 10″ to 468′ 2″	9′ 5″ to 409′ 5″
35.	Sandy rock, . . .	1′ 10″ to 470′ 0″	1′ 8″ to 411′ 1″
36.	Sandy slate, . . .	2′ 0″ to 472′ 0″	1′ 9″ to 412′ 10″
37.	Sandstone, ...	25′ 0″ to 497′ 0″	21′ 10″ to 434′ 8″
38.	Sandstone, gray, .	21′ 6″ to 518′ 6″	18′ 10″ to 453′ 6″
39.	Conglomerate sandstone, . . .	27′ 6″ to 546′ 0″	24′ 0″ to 477′ 6″
40.	Green sandstone,	7′ 10″ to 553′ 10″	6′ 11″ to 484′ 5″
41.	Green conglomerate, ...	11′ 0″ to 564 10″	9′ 7″ to 494′ 0″
42.	Sandstone, ...	3′ 0″ to 567′ 10″	2′ 7″ to 496′ 7″
43.	Green conglomerate, ...	24′ 6″ to 592′ 4″	21′ 6″ to 518′ 1″
44.	Green sandstone,	47′ 2″ to 639′ 6″	41′ 3″ to 559′ 4″
45.	Green sandstone and red shale, .	12′ 6″ to 652′ 0″	10′ 11″ to 570′ 3″

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 9, at Laurel Hill slope No. 2, driven vertically from fourth lift.

Hazleton basin.

No. of strata.	*Description.* (Dip 25° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	COAL, shelly, . .	4' 6" to 4' 6"	4' 1" to 4' 1"
2.	Gray rock, ...	6" to 5' 0'	5" to 4' 6"
3.	COAL, shelly, . .	3' 4" to 8' 4"	3' 1" to 7' 7"
4.	Gray rock, ...	11' 11" to 20' 3"	19' 1" to 26' 8"
5.	Gray rock, ...	9' 1" to 29' 4"	
6.	Conglomerate, . .	5' 4" to 34' 8"	11' 10" to 38' 6"
7.	Conglomerate, . .	7' 8" to 42' 4"	
8.	Gray rock, ...	4' 9" to 47' 1"	4' 4" to 42' 10"
9.	Slate, ...	6' 6" to 53' 7"	5' 11" to 48 9"
10.	Bone and slate, . .	1' 6" to 55' 1"	1' 4" to 50' 1"
11.	COAL, ...	3' 0" to 58' 1"	2' 8" to 52' 9"
12.	Bone and slate, . .	9" to 58' 10"	8" to 53' 5"
13.	COAL, ...	1' 11" to 60' 9"	1' 8" to 55' 1"
14.	Slate, ...	3' 3" to 64' 0'	2' 11" to 58' 0"
15.	Blue rock, ...	3' 0" to 67' 0"	2' 8" to 60' 8"
16.	Conglomerate, . .	14' 2" to 81' 2"	12' 10" to 73' 6"
17.	Conglomerate, . .	6' 3" to 87' 5"	5' 9" to 79' 3"
18.	Gray rock, hard, .	4' 0" to 91' 5"	3' 8" to 82' 11'
19.	Gray rock, ...	22' 4½" to 113' 9½"	57' 8" to 140' 7"
20.	Gray rock, ...	21' 8½" to 135' 6"	
21.	Gray rock, ...	17' 0½" to 152' 6½"	
22.	Gray rock, ...	2' 5" to 154' 11½"	
23.	Slate, ...	8' 6" to 163' 5½"	7' 9" to 148' 4"
24.	Gray rock, ...	4' 0" to 167' 5½ '	3' 8" to 152' 0"
25.	Slate, ...	3' 7" to 171' 0½"	3' 3" to 155' 3"
26.	Gray rock, ...	7½" to 171' 8"	6" to 155' 9"
27.	Slate, ...	8' 2" to 179 10"	7' 6" to 163' 3"
28.	Bone and slate, . .	1 5" to 181' 3"	1' 3" to 164' 6"
29.	COAL, ...	2' 5" to 183' 8"	2' 2" to 166' 8"
30.	Slate, ...	3" to 183' 11"	2" to 166' 10"
31.	COAL, ...	1' 2" to 185' 1"	1' 0" to 167' 10"
32.	Bone and slate, . .	1' 11" to 187' 0'	1' 8" to 169' 6"
33.	COAL, ...	1" to 187' 1"	1" to 169' 7"
34.	COAL, ...	9' 9½" to 196' 10½"	8' 11" to 178' 6"
35.	Bone, ...	4" to 197' 2½"	3" to 178' 9"
36.	COAL, ...	1' 4" to 198' 6½"	1' 2" to 179' 11"
37.	Slate, ...	7" to 199' 1½"	6" to 180' 5'
38.	COAL, ...	5' 6" to 204' 7½"	5' 0" to 185' 5"
39.	COAL, ...	9' 3" to 213' 10½"	8' 4" to 193' 9"
40.	Slate, ...	2' 6" to 216' 4½"	2' 3" to 196' 0"
41.	Blue rock, ...	4' 9" to 221' 1½"	4' 4" to 200' 4'
42.	Slate, ...	1' 8" to 222' 9½"	1' 6" to 201' 10"

See Cross Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 10, at Laurel Hill slope No. 2, driven vertically from fourth lift.

Hazleton basin.

No. of strata.	*Description.* (Dip 25° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	COAL, shelly, .	20' 10½'' to 20' 10½''	18' 11'' to 18' 11''
2.	Slate, ...	2' 1'' to 22' 11½''	1' 11'' to 20' 10''
3.	Gray rock, . . .	7'' to 23' 6½''	14' 8'' to 35' 6''
4.	Gray rock, . . .	15' 7½'' to 39' 2''	
5.	Rock, ...	11' 7'' to 50' 9''	21' 9'' to 57' 3''
6.	Rock, ...	12' 4'' to 63' 1''	
7.	Slate, ...	2' 9'' to 65' 10''	2' 6'' to 59' 9''
8.	COAL, ...	11'' to 66' 9''	10'' to 60' 7''
9.	Slate and bone, .	1' 4'' to 68' 1''	1' 2'' to 61' 9''
10.	COAL, ...	6' 4'' to 74' 5''	5' 9'' to 67' 6''
11.	Slate, ...	1' 11½'' to 76' 4½''	1' 8'' to 69' 2''
12.	Blue rock, . . .	4' 0'' to 80' 4½''	3' 8'' to 72' 10''
13.	Conglomerate, .	8' 0'' to 88' 4½''	16' 7'' to 89' 5''
14.	Conglomerate, .	10' 4'' to 98' 8½''	
15.	Gray rock, . . .	5' 3'' to 103' 11½''	61' 6'' to 150' 11''
16.	Gray rock, . . .	19' 9½'' to 123' 9''	
17.	Gray rock, . . .	25' 0½'' to 148' 9½''	
18.	Gray rock, . . .	16' 8'' to 165' 5½''	
19.	Gray rock, . . .	1' 1'' to 166' 6½''	
20.	Blue rock, . . .	3' 4'' to 169' 10½''	3' 2'' to 154' 1''
21.	Slate, ...	3' 0'' to 172' 10½''	2' 7'' to 156' 8''
22.	Blue rock, . . .	11' 1'' to 183' 11½''	10' 0'' to 166' 8''
23.	Slate, ...	2'' to 184' 1½''	1'' to 166' 9''
24.	COAL, ...	3'' to 184' 4½''	2'' to 166' 11''
25.	Slate, ...	5' 2'' to 189 6½''	4' 8'' to 171' 7''
26.	COAL, ...	1' 9'' to 191 3½''	1' 8'' to 173' 8''
27.	Slate, ...	7'' to 191' 10½'	6'' to 173' 9''
28.	COAL, ...	2' 2'' to 194' 0½''	2 0'' to 175 9''
29.	Slate and bone, .	6'' to 194' 6½''	5'' to 176' 2'
30.	COAL, ...	8' 9'' to 203' 3½''	8' 0'' to 184' 2''
31.	Bone and slate, .	5'' to 203' 8½''	4'' to 184' 6'
32.	COAL, ...	4' 8'' to 203' 4½''	4' 3'' to 188' 9''
33.	Slate, ...	9'' to 209' 1½''	8'' to 189' 5''
34.	COAL, ...	7'' to 209' 8½'	6'' to 189' 11''
35.	COAL, ...	6' 10½'' to 216' 7''	6' 3'' to 196' 2''
36.	Slate, ...	6'' to 217' 1''	5'' to 196' 7''
37.	COAL, ...	4' 4'' to 221' 5''	3' 11'' to 200' 6''
38.	Slate, ...	1' 10'' to 223' 3''	1' 8 ' to 202' 2''
39.	Blue rock, . . .	4' 9'' to 228' 0''	4' 5'' to 206' 7''

See Cross Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 11, at Laurel Hill slope No. 2, driven at an angle of 45° from fourth lift.

Hazleton basin.

No. of strata.	*Description.* (Dip about 46° S.)	*Thicknesses measured as cut in B. H.*	*Thicknesses perpendicular to dip.*
1.	Coal,	28′ 4″ to 28′ 4″	24′ 8″ to 24′ 8″
2.	Coal,	5′ 11″ to 34′ 3″	
3.	Slate,	7″ to 34′ 10″	6″ to 25′ 2″
4.	Coal,	15′ 3½″ to 50′ 1½″	10′ 11″ to 36′ 1″
5.	Slate,	2′ 0½″ to 52′ 2″	7′ 3″ to 43′ 4″
6.	Slate,	5′ 5″ to 57′ 7″	
7.	Slate,	2′ 7½″ to 60′ 2½″	
8.	Gray rock,	4′ 10″ to 65′ 0½″	3′ 6″ to 46′ 10″
9.	Conglomerate,	2′ 10″ to 67′ 10½″	2′ 1″ to 48′ 11′
10.	Gray rock,	2′ 7″ to 70′ 5½″	1′ 10″ to 50′ 9″
11.	Conglomerate,	4′ 10″ to 75′ 3½″	18′ 5″ to 69′ 2″
12.	Conglomerate,	4′ 9″ to 80′ 0½″	
13.	Conglomerate,	3′ 4″ to 83′ 4½″	
14.	Conglomerate,	1′ 1″ to 84′ 5½″	
15.	Conglomerate,	11 2″ to 95′ 7½″	
16.	Conglomerate,	6″ to 96′ 1½″	
17.	Blue rock,	9′ 10″ to 105′ 11½″	7′ 1″ to 76′ 3″
18.	Conglomerate,	5′ 9″ to 111′ 8½″	23′ 1″ to 99′ 4″
19.	Conglomerate,	15′ 11½″ to 127′ 8″	
20.	Conglomerate,	10′ 5″ to 138′ 1″	
21.	Slate,	6′ 0″ to 144′ 1″	5′ 4″ to 104′ 8″
22.	Slate,	1′ 4″ to 145′ 5″	
23.	Coal,	3′ 8″ to 149′ 1″	2′ 8″ to 107′ 4″
24.	Conglomerate,	10′ 11½″ to 160′ 0½″	12′ 4″ to 119′ 8″
25.	Conglomerate,	6′ 3″ to 166′ 3½″	
26.	Gray rock,	9′ 10″ to 176′ 1½″	7′ 1″ to 126′ 9″
27.	Gray rock, hard,	16′ 0½″ to 192′ 2″	11′ 6″ to 138′ 3″
28.	Gray rock,	16′ 7″ to 208′ 9″	28′ 6″ to 166′ 9″
29.	Gray rock,	15′ 4″ to 224′ 1″	
30.	Gray rock,	7′ 7½″ to 231′ 8½″	

No. of strata.	Description.	Thicknesses measured as cut in B. H.	Thicknesses perpendicular to dip.
31.	Blue rock, .	9′ 8″ to 241′ 4½″	6′ 11″ to 173′ 8″
32.	Slate, ...	2′ 4″ to 243′ 8½″	1′ 8″ to 175′ 4″
33.	Coal, shelly,	5′ 4″ to 249′ 0½″	3′ 10″ to 179′ 2″
34.	Slate, not much core,	4½″ to 249′ 5″	3″ to 179′ 5″
35.	Coal, . . .	5′ 6½″ to 254′ 11½″	3′ 11″ to 183′ 4″
36.	Slate, ...	4″ to 255′ 3½″	3″ to 183′ 7″
37.	Coal, ...	6′ 4½″ to 261′ 8″	4′ 7″ to 188, 2″
38.	Slate, ...	5″ to 262′ 1″	4″ to 188′ 6″
39.	Coal, ...	7′ 2″ to 269′ 3″	5′ 2″ to 193′ 8″
40.	Slate, ...	2′ 10½″ to 272′ 1½″	2′ 1″ to 195′ 9″
41.	Blue rock, .	6′ 1″ to 278′ 2½″	4′ 4″ to 200′ 1″

See Cross Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 12, at Laurel Hill slope No. 2, driven at an angle of 70° from fourth lift.

Hazleton basin.

No. of strata.	Description. (Dip 42° 30′ S.)	Thicknesses measured as cut in B. H.	Thicknesses perpendicular to dip.
1.	Distance from drill to face of slope, . .	35′ 5″ to 35′ 5″	—— ——
2.	Slate, ...	8″ to 36 1″	7″ to 7″
3.	Black rock, ...	5′ 10″ to 41′ 11″	3′ 11″ to 4′ 6″
4.	White rock, ...	1′ 3″ to 43′ 2″	10″ to 5′ 4″
5.	Slate, ...	3′ 10″ to 47′ 0″	2′ 7″ to 7′ 11″
6.	Blue rock, ...	2′ 4″ to 49′ 4″	1′ 7″ to 9′ 6″
7.	Gray rock, ...	11′ 8½″ to 61 0½″	13′ 6″ to 23′ 0″
8.	Gray rock, ...	8′ 4′ to 69′ 4½″	
9.	White rock, ...	1′ 6″ to 70′ 10½″	1′ 0″ to 24′ 0″
10.	Gray rock, ...	6′ 10½″ to 77′ 9″	4′ 7″ to 28′ 7′
11.	Slate, ...	5′ 4″ to 83′ 1″	3′ 8″ to 32′ 3″
12.	Coal, ...	4′ 2″ to 87′ 3″	2′ 10″ to 35′ 1″
13.	Slate, ...	1′ 1″ to 88′ 4″	8″ to 35′ 9″
14.	Slate, ...	1′ 3″ to 89′ 7″	10″ to 36′ 7″
15.	Blue rock, ...	4′ 3″ to 93′ 10″	2′ 10″ to 39′ 5″
16.	White spar, ...	2′ 5″ to 96′ 3″	9′ 10″ to 49′ 3″
17.	White spar, ...	10′ 0½″ to 106′ 3½″	
18.	White spar, ...	2′ 0″ to 108′ 3½″	
19.	Gray rock, ...	21′ 0″ to 129′ 3½″	37′ 6″ to 86′ 9′
20.	Gray rock, ...	7′ 9″ to 137′ 0½″	
21.	Gray rock, ...	20′ 10½″ to 157′ 11″	
22.	Gray rock, ...	5′ 10″ to 163′ 9″	
23.	Slate, ...	5′ 9½″ to 169′ 6½″	3′ 11″ to 90′ 8″
24.	Blue rock, ...	1′ 0″ to 170′ 6½″	7′ 10″ to 98′ 6″
25.	Blue rock, ...	10′ 6½″ to 181′ 1″	

No. of strata.	*Description.*	*Thicknesses measured as cut in C. H.*	*Thicknesses perpendicular to dip.*
26.	Slate, ...	4′ 1″ to 185′ 2′	2′ 9″ to 101′ 3″
27.	COAL, ...	1′ 0″ to 186′ 2″	7″ to 101′ 10″
28.	Slate and bone, . . .	9″ to 186′ 11″	6″ to 102′ 4″
29.	COAL, ...	1′ 4½″ to 188′ 3½″	2′ 8″ to 105′ 0″
30.	COAL, ...	2′ 7″ to 190′ 10½″	
31.	Slate and bone, . . .	1′ 2″ to 192′ 0½″	9″ to 105′ 9″
32.	COAL, ...	5′ 11½″ to 198′ 0″	4′ 2″ to 109′ 11″
33.	Slate and bone, . . .	10″ to 198′ 10′	7″ to 110′ 6″
34.	COAL, ...	1′ 3″ to 200′ 1″	10″ to 111′ 4″
35.	Slate, ...	6″ to 200 7 ′	4″ to 111′ 8″
36.	COAL, ...	3′ 7½″ to 204′ 2½″	2′ 5″ to 114′ 1″
37.	Slate, ...	1′ 0″ to 205′ 2½″	7″ to 114′ 8″
38.	COAL, ...	8′ 3″ to 213′ 5½″	5′ 8″ to 120′ 4″
39.	Slate, ...	1′ 1″ to 214′ 6½″	8″ to 121′ 0″
40.	COAL, ...	1′ 11″ to 216′ 5½″	2′ 5″ to 123′ 5″
41.	COAL, ...	1′ 8″ to 218′ 1½″	
42.	Slate, ...	1′ 0″ to 219′ 1½″	7″ to 124′ 0″
43.	Blue rock, ...	6′ 4″ to 225′ 5½″	7′ 5″ to 131′ 5″
44.	Blue rock, ...	4′ 6″ to 229′ 11½″	
45.	Slate, ...	6″ to 230′ 5½″	4″ to 131′ 9″
46.	COAL, ...	1′ 0″ to 231′ 5½″	7″ to 132′ 4″
47.	Slate, ...	1′ 0″ to 232′ 5½″	7″ to 132′ 11″
48.	Blue rock, ...	3′ 8″ to 236′ 1½″	6′ 9″ to 139′ 8″
49.	Blue rock, ...	6′ 4″ to 242′ 5½ ′	
50.	White spar, ...	6′ 7½″ to 249′ 1″	11′ 3″ to 150′ 11″
51.	White spar, ...	10′ 0″ to 259′ 1″	
52.	Slate, ...	8″ to 259′ 9″	6″ to 151′ 5″
53.	White spar, ...	2′ 7″ to 262′ 4″	1′ 8″ to 153′ 1″
54.	Gray rock, ...	9′ 10″ to 272′ 2″	15′ 8″ to 168′ 9″
55.	Gray rock, ...	9′ 3″ to 281′ 5″	
56.	Gray rock, ...	4′ 0″ to 285′ 5″	
57.	Slate, ...	3″ to 285′ 8″	2″ to 168′ 11′
58.	COAL, ...	3′ 5½″ to 289′ 1½″	5′ 4″ to 174′ 3″
59.	COAL, ...	4′ 5″ to 293′ 6½″	
60.	Slate, ...	5″ to 293′ 11½″	4′ to 174′ 7″
61.	COAL, ...	2′ 3″ to 296′ 2½″	1′ 6″ to 176′ 1″
62.	Slate, ...	2′ 5′ to 298′ 7½″	4′ 5″ to 180′ 6″
63.	Slate, ...	4′ 0″ to 302′ 7½″	
64.	Gray rock, ...	2′ 0″ to 304′ 7½″	1′ 3″ to 181′ 9″

See Cross Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Diamond Drill bore-hole No. 1, at Hazleton No. 3 colliery, driven horizontally from 2d lift to face of tunnel to Buck Mountain bed.

Hazleton basin.

No. of strata.	*Description.* (Dip about 25° 30′ S.)	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Gray rock, ...	22′ 5″ to 22′ 5″	9′ 8″ to 9′ 8″
2.	Conglomerate, . .	3′ 6″ to 25′ 11″	1′ 6″ to 11′ 2″
3.	Gray rock, ...	20′ 2″ to 46′ 1″	8′ 8″ to 19′ 10″
4.	Conglomerate, . .	6′ 0″ to 52′ 1″	2′ 7″ to 22′ 5″
5.	Gray rock, ...	2′ 10″ to 54′ 11″	1′ 3″ to 23′ 8″
6.	Conglomerate, . .	10′ 0″ to 64′ 11″	4′ 4″ to 28′ 0″
7.	Gray rock, ...	34′ 3″ to 99′ 2″	14′ 10″ to 42′ 10″
8.	Conglomerate, . .	12′ 7″ to 111′ 9″	5′ 5″ to 48′ 3″
9.	Gray rock, ...	3′ 5″ to 114′ 2″	1′ 0″ to 49′ 3″
10.	Conglomerate, . .	6″ to 114′ 8″	2″ to 49′ 5″
11.	Gray rock, ...	1′ 9″ to 116′ 5″	9″ to 50 2″
12.	Conglomerate, . .	1′ 2″ to 117′ 7″	6″ to 50′ 8″
13.	Gray rock, ...	6″ to 118′ 1″	2″ to 50′ 10″
14.	Conglomerate, . .	9″ to 118′ 10″	4″ to 51 2″
15.	Gray rock, ...	21′ 4″ to 140′ 2″	9′ 3″ to 60′ 5″
16.	Conglomerate, . .	2′ 5″ to 142′ 7″	1′ 0″ to 61′ 5″
17.	Gray rock, ...	3′ 0″ to 145′ 7″	1′ 3″ to 62′ 8″
18.	Conglomerate, . .	3′ 0″ to 148′ 7″	1′ 3″ to 63′ 11″
19.	Gray rock, ...	2′ 0″ to 150′ 7″	10″ to 64′ 9″
20.	Conglomerate, . .	1′ 0″ to 151′ 7″	5″ to 65′ 2″
21.	Gray rock, ...	1′ 0″ to 152′ 7″	5″ to 65′ 7″
22.	Slate, ...	3′ 9½″ to 156′ 4½″	1′ 8″ to 67′ 7″
23.	Gray rock, ...	12′ 2″ to 168′ 6½″	5′ 4″ to 72′ 6″
24.	Conglomerate, . .	5′ 2″ to 173′ 8½″	2′ 3′ to 74′ 10″
25.	Gray rock, ...	2′ 10″ to 176′ 6½″	1′ 3″ to 76′ 1″
26.	Conglomerate, . .	7″ to 177′ 1½″	3″ to 76′ 4″
27.	Gray rock, ...	6′ 6″ to 183′ 7½″	2′ 9″ to 79′ 1″
28.	Conglomerate, . .	10″ to 184′ 5½″	5″ to 79′ 6″
29.	Gray rock, ...	2′ 0″ to 186′ 5½″	10″ to 80′ 4″
30.	Conglomerate, . .	3′ 0″ to 189′ 5½″	1′ 3″ to 81′ 7″
31.	Gray rock, ...	3′ 0″ to 192′ 5½″	1′ 3″ to 82′ 10″
32.	Conglomerate, . .	2′ 0″ to 194′ 5½″	10″ to 83′ 8″
33.	Gray rock, ...	15′ 3″ to 209′ 8½″	6′ 8″ to 90′ 4″
34.	Conglomerate, . .	10″ to 210′ 6½″	5″ to 90′ 9″
35.	Gray rock, ...	9″ to 211′ 3½″	4″ to 91′ 1″
36.	Conglomerate, . .	1′ 1″ to 212′ 4½′	6″ to 91′ 7″
37.	Slate, ...	2″ to 212′ 6½″	1″ to 91′ 8″
38.	Conglomerate, . .	5″ to 212′ 11½″	2″ to 91′ 10″
39.	Gray rock, ...	1′ 4″ to 214′ 3½″	7″ to 92′ 5″
40.	Conglomerate, . .	2′ 4″ to 216′ 7½″	1′ 0″ to 93′ 5″
41.	Gray rock, ...	1′ 3″ to 217′ 10½″	6″ to 93′ 11″
42.	Conglomerate, . .	3′ 0″ to 220′ 10½″	1′ 3″ to 95′ 2″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
43.	Gray rock, ...	5′ 0″ to 225′ 10½″	2′ 2″ to 97′ 4″
44.	Conglomerate, . .	6′ 8″ to 232′ 6½″	2′ 10″ to 100′ 2″
45.	Gray rock, hard, .	1′ 4″ to 233 10½″	7″ to 100′ 9″
46.	Conglomerate, . .	3′ 0″ to 236′ 10½″	1′ 3″ to 102′ 0″
47.	Gray rock, hard, .	5″ to 237′ 3½″	2″ to 102′ 2″
48.	Conglomerate, . .	4′ 10″ to 242′ 1½″	2′ 1″ to 104′ 3″
49.	Gray rock, ...	6′ 0″ to 248 1½″	2′ 7″ to 106′ 10″
50.	Conglomerate, . .	1′ 0″ to 249′ 1½″	5″ to 107′ 3″
51.	Gray rock, ...	1′ 0″ to 250′ 1½″	5″ to 107′ 8″
52.	Conglomerate, . .	1′ 7″ to 251′ 8½″	8″ to 108′ 4″

See Cross Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 30, at Hazleton slope No. 3, driven horizontally from west gangway, 6th lift.

Hazleton basin.

No. of strata.	*Description.* (Dip undetermined.)	*Thicknesses measured horizontally.*
1.	Sandy slate, ...	1′ 4″ to 1′ 4″
2.	Fine gray spar rock, ...	4′ 0″ to 5′ 4″
3.	Coarse gray spar rock, ...	24′ 2″ to 29′ 6″
4.	Fine conglomerate, ...	17′ 5″ to 46′ 11″
5.	Sandstone with spar, ...	13 2″ to 60′ 1″
6.	COAL, shelly, ...	1′ 6″ to 61′ 7″
7.	COAL, good, ...	1′ 2″ to 62′ 9″
8.	COAL, shelly, ...	7′ 4″ to 70′ 1″
9.	Slate and clod, ...	1′ 4″ to 71′ 5″
10.	Slate and bony COAL, ...	1′ 7″ to 73′ 0″
11.	COAL, good, ...	8′ 4″ to 81′ 4″
12.	Slate (Dip 70°), ...	2″ to 81′ 6″
13.	COAL, shelly, ...	1′ 3″ to 82′ 9″
14.	Slate and bone, ...	8″ to 83′ 5″
15.	COAL, good, ...	2′ 4″ to 85′ 9″
16.	Slate, ...	3″ to 86′ 0″
17.	COAL, shelly, ...	2′ 2″ to 88′ 2″
18.	Slate, ...	6″ to 88′ 8″
19.	COAL, shelly, ...	2′ 0″ to 90′ 8″
20.	COAL, bony, ...	8″ to 91′ 4″
21.	COAL, good, ...	1′ 3″ to 92′ 7″
22.	Slate, ...	1′ 10″ to 94′ 5″
23.	COAL, shelly, ...	7″ to 95′ 0″
24.	Sandy slate, ...	23′ 11″ to 118′ 11″
25.	COAL, ...	6″ to 119′ 5″
26.	Slate with spar and sulphur balls, ...	22′ 1″ to 141′ 6″
27.	COAL, ...	5″ to 141′ 11″
28.	Soft slate, ...	5′ 3″ to 147′ 2″
29.	COAL, soft, ...	4′ 11″ to 152′ 1″
30.	Conglomerate, ...	14 7″ to 166′ 8″

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 41, at Hazleton slope No. 3. driven horizontally from west gangway A, 6th lift.

Hazleton basin.

No. of strata.	*Description.* (Dip undermined.)	*Thicknesses measured horizontally.*
1.	Sand slate,	16' 7'' to 16' 7''
2.	Slate and bone,	1' 0'' to 17' 7''
3.	Sand slate,	3' 10'' to 21' 5''
4.	Fine gray rock,	15' 7'' to 37' 0''
5.	Fine conglomerate,	39' 6'' to 76' 6''
6.	COAL,	12' 10'' to 89' 4''
7.	Sand slate,	2' 0'' to 91' 4''
8.	Fine gray rock,	2' 0'' to 93' 4''

See Mine Sheet No. 2, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole at Laurel Hill or Hazleton No. 4 slope, driven northwards from west end of proving tunnel in 4th lift.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*
1.	Conglomerate,	5' 2'' to 5' 2''
2.	Conglomerate,	2' 9'' to 7 11''
3.	Blue rock,	3' 1'' to 11' 0''
4.	COAL, shelly, no core,	2' 2'' to 13' 2''
5.	Conglomerate,	1' 2½' to 14' 4½''
6.	Conglomerate, fine, hard,	8' 0'' to 22' 4½''
7.	COAL and slate,	4'' to 22' 8½''
8.	Conglomerate, fine, hard,	9' 10'' to 32' 6½''
9.	Conglomerate, fine, hard,	11' 8'' to 44' 2½''
10.	Slate and COAL, no core,	8'' to 44' 10½'
11.	COAL, shelly, no core,	1' 8'' to 46' 6½''
12.	Slate, soft, no core,	2' 3'' to 48' 9½''
13.	Blue rock,	3' 2½'' to 52' 0''
14.	Blue rock,	1' 1'' to 53' 1''
15.	Gray rock,	3' 9'' to 56' 10''
16.	Conglomerate, hard,	11' 6'' to 68' 4''
17.	Conglomerate,	1' 10'' to 70' 2''
18.	Gray rock, hard,	12' 8'' to 82' 10''
19.	Conglomerate, hard,	6'' to 83' 4''
20.	Conglomerate,	1' 8'' to 85' 0''
21.	Gray rock,	8' 1'' to 93' 1''
22.	Conglomerate,	2' 6'' to 95' 7'
23.	Gray rock,	1' 8'' to 97' 3''

No. of strata.	*Description.*	*Thicknesses measured horizontally.*
24.	Gray rock,	4′ 8″ to 101′ 11″
25.	Blue rock, hard,	9′ 0″ to 110′ 11″
26.	Blue rock,	1′ 7″ to 112′ 6″
27.	Slate,	4″ to 112′ 10″
28.	Coal,	12′ 10″ to 125′ 8″
29.	Slate,	2″ to 125′ 10″
30.	Coal,	4′ 11″ to 130′ 9″
31.	Slate,	1′ 4″ to 132′ 1″
32.	Coal,	4′ 7″ to 136′ 8″
33.	Coal,	4′ 10″ to 141′ 6″
34.	Coal,	16′ 7″ to 158′ 1″
35.	Coal,	9′ 9″ to 167′ 10″

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole at the bottom of Hazleton slope No. 4, driven horizontally from pump chamber.

Hazleton basin.

No. of strata.	*Description.* (Dip undetermined.)	*Thicknesses measured horizontally.*
1.	Coal,	27′ 6″ to 27′ 6″
2.	Slate,	5″ to 27′ 11″
3.	Rock,	31′ 0″ to 58′ 11″
4.	Slate,	5′ 6″ to 64′ 5″
5.	Rock,	6′ 6″ to 70′ 11″
6.	Slate,	4′ 6″ to 75′ 5″
7.	Rock,	5′ 0″ to 80′ 5″
8.	Coal,	27′ 9½″ to 108′ 2½″
9.	Slate,	41′ 8½″ to 149′ 11″
10.	Coal,	31′ 6″ to 181′ 5″
11.	Slate,	8′ 0″ to 189′ 5″
12.	Rock,	19′ 5″ to 208′ 10″
13.	Slate,	6′ 10″ to 215′ 8″
14.	Rock,	12′ 8″ to 228′ 4″
15.	Coal,	10′ 2″ to 238′ 6″
16.	Slate,	11′ 3″ to 249′ 9″

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 21, at the foot of Hazleton slope No. 4, or Laurel Hill No. 2 slope, driven south at an angle of 33°.

Hazleton basin.

No. of strata.	*Description.*		*Thicknesses measured perpendicular to dip.*		
0.	Slate, . . .	Parting slate, "E" bed, . .	8″	to	8″
1.	COAL, good,	"E" bed, ...	6′ 0″	to	6′ 8″
2.	Slate, . . .	Bottom slate, "E" bed. Commenced boring, . . .	4″	to	7′ 0″
3.	Sand slate, ...	Sandstone.	14′ 8″	to	21′ 8″
4.	Fine gray rock, ...		3′ 9″	to	25′ 5″
5.	Fine conglomerate, ...		3′ 7″	to	29′ 0″
6.	Fine gray rock, ...		5′ 2″	to	34′ 2″
7.	Fine conglomerate, ...		9′ 0″	to	43′ 2″
8.	Fine blue rock, ...		1′ 2″	to	44′ 4″
9.	Bone COAL (leader), ...		3″	to	44′ 7″
10.	Fine blue rock, ...	Sandstone.	2′ 9″	to	47′ 4″
11.	Fine gray rock, ...		4′ 0″	to	51′ 4″
12.	Hard slate, ...		7″	to	51′ 11″
13.	Good, hard COAL, ...	COAL.	5′ 0″	to	56′ 11″
	Bone coal, ...		1′ 2″	to	58′ 1′
	COAL, good, ...		4″	to	58′ 5″
	Good COAL and seam of slate 1″, . .		3′ 6″	to	61′ 11″
14.	Sand slate, ...		22′ 2″	to	84′ 1″
15.	Fine gray rock, ...	Sandstone.	17′ 1″	to	101′ 2″
16.	Blue rock, ...		35′ 11″	to	137′ 1″
17.	Soft slate, ...		33′ 5″	to	170′ 6″
18.	PARLOR BED, ...		3′ 6″	to	170′ 4″
19.	Slate, ...	Slate.	4′ 0″	to	178′ 0″
20.	Fine blue rock, ...		6′ 5″	to	184′ 5″
21.	Hard slate, ...		31′ 6″	to	215′ 11″
22.	Soft COAL (SKIDMORE BED), ...		6′ 0″	to	221′ 11″
23.	Hard slate, ...	Slate.	18′ 0″	to	239′ 11″
24.	Sand slate, ...		18′ 10″	to	258′ 9″
25.	Fine blue rock, ...		6′ 0″	to	264′ 9″
26.	Fine conglomerate rock, coarse SS., . . .		32′ 4″	to	297′ 1″
27.	Fine blue rock, ...		4′ 0″	to	301′ 1″
28.	Fine conglomerate rock, . .	Fine Sandstone.	12′ 0″	to	313′ 1″
29.	Fine gray rock, ...		5′ 0″	to	318′ 1″
30.	Fine conglomerate rock, . .		9′ 6′	to	327′ 7″
31.	Fine gray rock, ...		1′ 6″	to	329′ 1″
32.	Fine conglomerate rock, . .		4′ 0″	to	333′ 1″
33.	Fine gray rock, ...		5′ 9″	to	338′ 10″
34.	Fine conglomerate rock, . .		6′ 0″	to	344′ 10″
35.	Fine gray rock, ...		10′ 0″	to	354′ 10″
36.	Hard slate, ...		1′ 0″	to	355′ 10″
37.	Fine blue rock, fine sandstone, ...		1′ 8″	to	357′ 6″
38.	Fine conglomerate, ...		24′ 0″	to	381′ 6″

No. of strata.	*Description.*		*Thicknesses measured perpendicular to dip.*
39.	Good COAL (LEADER OR B. MTN.),		1' 2" to 382' 8"
40.	Hard slate,	Slate.	10" to 383' 6"
41.	Sand slate,		2' 0" to 385' 6"
42.	Fine gray rock,		3' 0" to 388' 6"
43.	Fine conglomerate rock,		21' 7" to 410' 1"
44.	Fine gray rock,		13' 6" to 423' 7"
45.	Fine conglomerate rock,		6' 6" to 430' 1"
46.	Hard slate,		2' 10' to 432' 11"
47.	Fine blue rock,		7' 0" to 439' 11"
48.	Fine gray rock,		2' 0" to 441' 11"
49.	Coarse pebble conglomerate,		38' 8" to 480' 7"
50.	Green sandstone,		4' 9" to 485' 4"

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Mammoth coal bed at Hazleton slope No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
1.	Top rock.	
2.	Inferior COAL and slate (TOP CLOD),	4' 0" to 4' 0"
3.	Slate parting,	4' to 4' 4"
4.	COAL (SIX-FOOT),	6' 2" to 10' 6"
5.	Parting.	—— ——
6.	COAL (THIRD BENCH),	2' 7" to 13' 1"
7.	Bone,	2" to 13' 3"
8.	COAL (SECOND BENCH),	2' 8" to 15' 11"
9.	Slate,	4" to 16' 3"
10.	COAL (FIRST BENCH),	2' 1" to 18' 4'
11.	Parting.	—— ——
12.	COAL (SEVEN-FOOT),	7' 2" to 25' 6"
13.	Slate,	1" to 25' 7"
14.	COAL (FOUR-FOOT),	5' 2" to 30' 9"
15.	Bottom slate.	—— ——
	Total coal,	29' 10"
	Total thickness,	30' 9"

See Mine Sheet No. 2, Atlas Eastern Middle Anthracite Field, Part I.

Section of Mammoth coal bed from bore-hole No. 16, at Hazleton slope No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 3°)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Slate (hard).	—— ——	—— ——
2.	Bone and slate, . . .	1' 11" to 1' 11"	1' 11" to 1' 11"
3.	COAL (good), ...	1' 10" to 3' 9"	1' 10" to 3' 9"
4.	Slate and bone COAL,	5" to 4' 2"	5" to 4' 2"
5.	COAL (good), ...	1' 10" to 6' 0"	1' 10" to 6' 0"
6.	Slate (hard), ...	9" to 6' 9"	9" to 6' 9"
7.	COAL (good), ...	7' 4" to 14' 1"	7' 4" to 14' 1"
8.	Bone COAL, ...	8" to 14' 9"	8" to 14' 9"
9.	COAL (good), ...	9" to 15' 6"	9" to 15' 6"
10.	Slate (hard), ...	8" to 16' 2"	8" to 16' 2"
11.	COAL (good), ...	8' 6" to 24' 8"	8' 5" to 24' 7"
12.	Slate (hard), . . .	11" to 25' 7"	11" to 25' 6"
13.	COAL (good), ...	5' 11" to 31' 6"	5' 11" to 31' 5"
14.	Slate (hard).	—— ——	—— ——

Total COAL, ... 26' 1"
Total thickness, . . 31' 5"

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Mammoth coal bed from bore-hole No. 19, at Hazleton No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 28° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Clod and slate.	—— ——	—— ——
2.	COAL (good), ...	2' 0" to 2' 0"	1' 8" to 1' 8"
3.	Slate (hard), ...	6" to 2' 6"	6" to 2' 2"
4.	COAL (good), ...	1' 6" to 4' 0"	1' 4" to 3' 6"
5.	Bone COAL, ...	1' 1" to 5' 1"	10" to 4' 4"
6.	COAL (good), ...	2' 0" to 7' 1"	1' 11" to 6' 3"
7.	Bone and slate, . . .	1' 11" to 9' 0"	1' 8" to 7' 11"
8.	COAL (good), ...	3' 9" to 12' 9"	3' 4" to 11' 3"
9.	Slate (hard), ...	8" to 13' 5"	7" to 11' 10"
10.	COAL (good), ...	3' 10" to 17' 3"	3' 5" to 15' 3"
11.	Soft slate and dirt, . .	1' 6" to 18' 9"	1' 4" to 16' 7"
12.	COAL (good), ...	8' 3" to 27' 0"	7' 3" to 23' 10"
13.	Bone COAL, ...	3" to 27' 3"	3" to 24' 1"
14.	Slate, ...	10" to 28' 1"	9" to 24' 10"
15.	COAL (good), ...	6' 7" to 34' 8"	5' 9" to 30' 7"
16.	Light gray sandstone.	—— ——	—— ——

Total COAL, ... 24' 8"
Total thickness, . . 30' 7"

See Section No. 61, Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of the Wharton coal bed from bore-hole No. 19, at Hazleton No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 28° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Slate.	—— ——	—— ——
2.	COAL (good), ...	6" to 6'	5" to 5"
3.	Slate, ...	4' 0' to 4' 6"	3' 6" to 3' 11"
4.	COAL (good), ...	1' 0" to 5 6"	10½" to 4' 9½"
5.	Slate, ...	1' 0" to 6' 6"	10½" to 5' 8"
6.	COAL (good), ...	3' 5" to 9' 11"	3' 1" to 8' 9"
7.	Slate.	—— ——	—— ——
	Total COAL, ...	4' 4½"	
	Total thickness, . .	8' 9"	

See Section No. 61, Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of the Gamma Coal bed from bore-hole No. 19, at Hazleton No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 28° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Slate.	—— ——	—— ——
2.	COAL (good), ...	6" to 6"	5" to 5"
3.	Slate, ...	1' 3" to 1' 9"	1' 1" to 1' 6"
4.	COAL (good), ...	10" to 2' 7"	9" to 2' 3"
5.	Bone and slate, ...	4" to 2' 11"	3" to 2' 6"
6.	COAL (good), ...	2' 0" to 4' 11"	1' 10" to 4' 4"
7.	Slate.	—— ——	—— ——
	Total COAL, ...	3' 0"	
	Total thickness, . .	4' 4"	

See Section No. 61, Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Buck Mountain bed from bore-hole No. 19, at Hazleton No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 28° N.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Slate.	—— ——	—— ——
2.	COAL, good, ...	2′ 0″ to 2′ 0′	1 10′ to 1′ 10′
3.	Slate, ...	8″ to 2′ 8″	7′ to 2 5′
4.	COAL, good, ...	1′ 0″ to 3′ 8″	10″ to 3′ 3″
5.	Slate, ...	4″ to 4′ 0″	3″ to 3′ 6″
5.	COAL, good, ...	4′ 10″ to 8′ 10″	7′ 4″ to 7′ 10″
7.	Slate.	—— ——	—— ——
	Total COAL, ...	7′ 0″	
	Total thickness, ...	7′ 10″	

See Section No. 61, Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 17, South of Hazleton No. 6 colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 20°.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	16′ 0″ to 16′ 0″	15′ 0″ to 15′ 0″
2.	Sandstone, light gray, . .	84′ 4″ to 100′ 4″	79′ 3″ to 94′ 3″
3.	Slate and bone, ...	1′ 6″ to 101′ 10″	1′ 4″ to 95′ 7″
4.	COAL, ... } MAMMOTH	23′ 4″ to 125′ 2″	21 11″ to 117′ 6″
5.	Slate and bone, } BED,	1′ 8″ to 126′ 10″	1′ 6″ to 119′ 0″
6.	Slate, ...	1′ 8″ to 128′ 6″	1′ 7″ to 120′ 7″
7.	Sandstone, dark gray, . .	13′ 6″ to 141′ 0″	12′ 8″ to 133′ 3″

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of bore-hole No. 16, at Crystal Ridge colliery.

Hazleton basin.

No. of strata.	*Description.* (Dip 3°.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	12′ 0″ to 12′ 0″	11′ 10″ to 11′ 10″
2.	Sandstone, light gray, .	43′ 9″ to 55′ 9″	43′ 7″ to 55′ 5″
3.	Slate, ...	10″ to 56′ 7″	9″ to 56′ 2″
4.	COAL and bone, ...	4 3″ to 60′ 10″	4′ 2″ to 60′ 4″
5.	Slate, ...	7′ 11″ to 68′ 9″	7′ 10″ to 68′ 2″
6.	COAL and bone, ...	1′ 2″ to 69′ 11″	1′ 2″ to 69′ 4″
7.	Slate, ...	7′ 6″ to 77′ 5″	7′ 5″ to 76 9″
8.	Sandstone, coarse, . . .	10′ 10″ to 88′ 3′	10′ 9″ to 87′ 6″
9.	Slate, ...	4′ 10″ to 93′ 1″	4′ 9″ to 92′ 3″
10.	Sandstone, ...	12′ 6″ to 105 7″	12′ 5″ to 104′ 8″
11.	Slate, ...	4″ to 105′ 11″	4″ to 105′ 0″

No. of strata.	Description. (Dip 30°)		Thicknesses measured vertically.	Thicknesses perpendicular to dip.
12.	COAL, . .	MAMMOTH BED,	26' 2" to 132' 1"	31' 4" to 136 4"
13.	Slate and bone, . .		5' 4" to 137' 5"	
14.	Slate, ...		3' 0" to 140' 5"	2' 11" to 139' 3"
15.	Sandstone, ...		9' 9" to 150' 2"	9' 8" to 148' 11"

See Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Mammoth coal bed from bore-hole No. 31, at Crystal Ridge colliery.

Hazleton basin.

No. of strata.	Description. (Dip 9°.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Slate.		
2.	COAL, ...	2' 11" to 2' 11"	2' 10" to 2' 10"
3.	Slate, ...	3" to 3' 2"	3" to 3' 1"
4.	COAL, ...	2' 1" to 5' 3"	2' 1" to 5' 2"
5.	Slate, ...	5" to 5' 8"	5" to 5' 7"
6.	COAL, good, ...	11' 4" to 17' 0"	11' 2" to 16' 9"
7.	Slate, ...	6" to 17' 6"	6" to 17' 3'
8.	COAL, good, ...	8' 0" to 25' 6"	7' 11" to 25' 2"
9.	Slate, ...	9" to 26' 3'	9" to 25' 11"
10.	COAL, good, ...	4' 11" to 31' 2"	4' 10" to 30' 9'
11.	Sandstone.		
	Total COAL, ...	28' 10"	
	Total thickness, ...	30' 9"	

See Section No. 56, Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

Section of Mammoth coal bed from bore-hole No. 33, at Crystal Ridge colliery.

Hazleton basin.

No. of strata.	Description. (Dip 9°.)	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
1.	Slate.		
2.	Coal, good, ...	1' 10" to 1' 10"	1' 10" to 1' 10"
3.	Slate and bone, . . .	6" to 2' 4"	6" to 2' 4"
4.	Coal, good, ...	11' 4" to 13' 8"	11' 2" to 13' 6"
5.	Slate, ...	11" to 14' 7"	11" to 14' 5"
6.	Coal, good, ...	8' 3" to 22' 10"	8' 2" to 22' 7"
7.	Slate, ...	11" to 23' 9"	10" to 23' 5"
8.	Coal, good, ...	6' 6" to 30' 3"	6' 5" to 29' 10"
9.	Slate, ...	10" to 31' 1"	10" to 30 8"
10.	Sandstone.		

See Section No. 57, Columnar Section Sheet No. III and Mine Sheet No. II, Atlas Eastern Middle Anthracite Field, Part I.

CHAPTER VII.

Sections in the Western Middle Coal field.

Section at North Franklin collieries Nos. 1 and 2 from Holmes bed to Lower Lykens Valley bed.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	HOLMES BED NO. X,	3' 0'' to 3' 0''
2.	Strata,	83' 0'' to 86' 0''
3.	MAMMOTH BED NO. IX, TOP SPLIT,	12' 0'' to 98' 0''
4.	Strata,	44' 0'' to 142' 0''
5.	MAMMOTH BED NO. VIII, BOTTOM SPLIT,	13' 0'' to 155' 0''
6.	Strata,	112' 0'' to 267' 0''
7.	SKIDMORE BED NO. VII,	3' 0'' to 270' 0''
8.	Strata,	72' 0'' to 342' 0''
9.	SEVEN-FOOT BED NO. VI,	7' 0'' to 349' 0''
10.	Strata,	129' 0'' to 478' 0''
11.	Slate,	15' 0'' to 493' 0''
12.	BUCK MOUNTAIN BED NO. V,	7' 0'' to 500' 0''
13.	Strata,	130' 0'' to 630' 0''
14.	COAL BED,	5' 0'' to 635' 0''
15.	Strata,	153' 0'' to 788' 0''
16.	UPPER LYKENS VALLEY BED NO. I,	11' 0'' to 799' 0''
17.	Strata,	120' 0'' to 919' 0''
18.	LOWER LYKENS VALLEY BED NO. O,	10' 0'' to 929' 0''

See Columnar Section Sheet No. I and Mine Sheet No. VIII, Atlas Western Middle Anthracite Field Part II.

Section of Water Level tunnel at Bear Valley colliery, beginning 800 feet from mouth of tunnel.

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No of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Slate and sandstone,	44' 0 to 44' 0'	24' 0'' to 24' 0''
2.	COAL, shelly,	6' 0'' to 50' 0''	1' 5'' to 25' 5''
3.	Slate, SS. and fire clay,	50' 0'' to 100' 0''	27 0'' to 52' 5''
4.	COAL BED,	10' 0'' to 110' 0''	6' 0'' to 58' 6''
5.	Slate,	67' 0'' to 177' 0''	45' 0'' to 103' 5'

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
6.	SS. and hard slate, .	18′ 0 to 195′ 0″	14′ 0″ to 117′ 5″
7.	MAMMOTH BED, . .	41′ 0″ to 236′ 0″	32′ 0″ to 149′ 5″
8.	Dark slate and hard SS, ...	23′ 0″ to 259′ 0	17′ 0″ to 166′ 5″
9.	COAL, ...	1′ 6″ to 260′ 6″	1′ 0″ to 167′ 5″
10.	Slate, ...	62′ 6″ to 323′ 0″	48′ 6″ to 215′ 11′
11.	COAL, ...	1′ 6″ to 324′ 6″	1′ 0″ to 216′ 11′
12.	Slate and fire clay, .	43′ 6″ to 368′ 0″	32′ 0″ to 248′ 11″
13.	COAL, ...	3′ 0″ to 371′ 0″	1′ 4″ to 250′ 3″
14.	Slate and fire clay, .	15′ 0″ to 386′ 0″	10′ 0″ to 260′ 3″
15.	COAL BED, ...	15′ 0″ to 401′ 0″	12′ 0″ to 272′ 3″
16.	Strata, ...	62′ 0″ to 463′ 0″	44′ 0″ to 316′ 3″
17.	COAL, ...	5′ 0″ to 468′ 0″	3′ 6″ to 319′ 9″
18.	Strata, ...	30′ 0″ to 498′ 0″	21′ 0′ to 340′ 9′
19.	COAL, ...	2′ 0″ to 500′ 0″	1 8″ to 342′ 5″
20.	Strata, ...	14′ 0″ to 514′ 0″	9′ 0″ to 351′ 5″
21.	COAL, ...	4′ 0″ to 518′ 0″	3′ 4″ to 354′ 9″
22.	Strata, ...	10′ 0″ to 528′ 0″	8′ 0″ to 362′ 9″
23.	COAL, ...	2′ 0″ to 530′ 0″	1′ 0″ to 363′ 9″
24.	Strata, ...	103′ 0″ to 633′ 0″	73′ 0″ to 436′ 9′
25.	COAL, ...	3′ 0″ to 636′ 0″	2′ 5″ to 439′ 2″
26.	Strata, ...	26′ 0″ to 662′ 0″	18′ 6″ to 457′ 8′
27.	COAL, ...	1′ 6″ to 663′ 6″	1′ 3″ to 458′ 11″
28.	Strata, ...	346′ 6″ to 1010′ 0″	245′ 0″ to 703′ 11″
29.	COAL BED, ...	9′ 0″ to 1019′ 0″	7′ 8″ to 711′ 7″
30.	Strata, ...	127′ 0″ to 1146′ 0″	90′ 0″ to 801′ 7″
31.	COAL, ...	3′ 0″ to 1149′ 0″	2′ 6″ to 804′ 1″
32.	Strata, ...	16′ 0″ to 1165′ 0″	11′ 0″ to 815′ 1″
33.	COAL, ...	1′ 0″ to 1166′ 0″	7″ to 815′ 8″

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part I.

Section of Water Level tunnel at Burnside colliery.

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No of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	COAL and slate. Dip 50° S., ...	2′ 0″ to 2′ 0′	1′ 8″ to 1′ 8″
2.	Silicious sandstone, .	23′ 0″ to 25′ 0″	17′ 6″ to 19′ 2″
3.	COAL, ...	1″ to 25′ 1″	1″ to 19′ 3″
4.	Silicious sandstone, .	12 0″ to 37′ 1″	9′ 0″ to 28′ 3″
5.	Slate, ...	5′ 0″ to 42′ 1″	4′ 0′ to 32 3″
6.	Slaty sandstone, . .	11′ 0″ to 53′ 1″	8′ 8″ to 40′ 11″
7.	Silicious sandstone,	34′ 6″ to 87′ 7″	29′ 6″ to 70′ 5″
8.	Slate. Dip 71° S., .	'08′ 6″ to 196′ 1″	100′ 0′ to 170′ 5″
9.	COAL BED No, XI,	5 0″ to 201′ 1″	4′ 3″ to 174′ 8″
10.	Slate. Dip 59° N.,	3′ 6″ to 204 7″	2′ 8′ to 177′ 4″
11.	Silicious sandstone	15′ 0″ to 219 7″	13′ 0″ to 190′ 4″

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
12.	Coal. Dip 58° N.,	2′ 0″ to 221′ 7″	1′ 6″ to 191′ 10″
13.	Slate and SS. Dip 82° N.,	56′ 6″ to 278′ 1″	53′ 0′ to 244′ 10″
14.	Silicious sandstone,	20′ 2′ to 298′ 3″	19′ 8″ to 264 6″
15.	Slate,	9′ 10″ to 308′ 1″	9′ 6″ to 274′ 0″
16.	Coal bed No. X,	13′ 7″ to 321′ 8″	13′ 2″ to 287′ 2″
17.	Slate. Dip 82° N.,	34′ 0″ to 355′ 8″	33′ 0″ to 320′ 2″
18.	Silicious sandstone,	31′ 0″ to 386′ 8″	30′ 3′ to 350 5″
19.	Slate,	2′ 10″ to 389′ 6″	2′ 10″ to 353′ 3″
20.	Coal. Dip 83° N.,	2″ to 389′ 8″	2″ to 353′ 5″
21.	Silicious sandstone,	27′ 0″ to 416′ 8″	26′ 8′ to 380′ 1″
22.	Sandy slate,	28 0″ to 444′ 8″	27′ 6″ to 407′ 7″
23.	Silicious sandstone,	50′ 9″ to 495′ 5″	49′ 4″ to 456′ 11″
24.	Coal,	3″ to 495′ 8″	3″ to 457′ 2″
25.	Slate,	29′ 7″ to 525′ 3″	21′ 2″ to 478′ 4″
26.	Coal bed No. VIII,	4′ 5″ to 529′ 8″	11′ 0″ to 489′ 4″
27.	Slate. Dip 74° N.,	10′ 2″ to 539′ 10″	10′ 0″ to 499′ 4″
28.	Dark silicious SS.,	20′ 0″ to 559′ 19″	19′ 0″ to 518′ 4″
29.	Coal. Dip 77° N.,	7″ to 560′ 5″	7″ to 518′ 11″
30.	Slate,	3′ 6″ to 563′ 11″	3′ 4″ to 522′ 3″
31.	Hard silicious SS.,	37′ 2″ to 601′ 1″	34′ 6″ to 556′ 9″
32.	Coal. Dip 54° N.,	3′ 6″ to 604′ 7″	2′ 8″ to 559′ 5″
33.	Slate,	28′ 0″ to 632′ 7″	22′ 0″ to 581′ 5″
34.	Coal. Dip 48° N.,	5″ to 633′ 0″	4″ to 581′ 9″
35.	Slate,	11′ 7″ to 644′ 7″	7′ 0″ to 588′ 9″
36.	Coal. Dip 34° N.,	7″ to 645′ 2″	5″ to 589′ 2″
37.	Slate,	22′ 0″ to 667′ 2″	12″ 0′ to 601′ 2″
38.	Silicious sandstone,	7′ 0″ to 674′ 2″	5′ 0″ to 606′ 2″
39.	Sandy slate,	9′ 0″ to 683′ 2″	7′ 2″ to 613′ 4′
40.	Silicious sandstone,	1′ 0″ to 684′ 2″	10″ to 614′ 2″
41.	Coal. Dip 55° N.,	6″ to 684′ 8″	4″ to 614 6″
42.	Hard silicious SS.,	13′ 2″ to 697′ 8″	9′ 0″ to 623′ 6″
43.	Slate. Dip 33° N.,	4′ 6″ to 702′ 2″	2′ 6″ to 626′ 0″
44.	Silicious SS. Dip 38° N.,	58′ 0″ to 760′ 2″	34′ 0″ to 660′ 0″
45.	Hard slaty sandstone,	2′ 0″ to 762′ 2″	1′ 2″ to 661′ 2″
46.	Slate,	1′ 6″ to 763′ 8″	1′ 0″ to 662′ 2″
47.	Coal, dirty. Dip 37° N.,	1′ 0″ to 764′ 8″	8″ to 662′ 10″
48.	Sandy slate,	32′ 6″ to 797′ 2″	21′ 0″ to 683′ 10″
49.	Soft slate,	10′ 9″ to 807′ 11″	7′ 8″ to 691′ 6″
50.	Coal bed No. V,	11′ 7″ to 819′ 6″	8′ 6″ to 700′ 0″
51.	Slate,	6′ 3″ to 825′ 9″	4′ 9″ to 704′ 9″
52.	Coal,	3′ 2″ to 827′ 11″	1′ 10″ to 706′ 7″
53.	Slate,	3′ 0″ to 830′ 11″	2′ 3″ to 708′ 10″
54.	Coal and dirt, V,	3′ 0″ to 833′ 11″	2′ 3″ to 711′ 1″
55.	Slate,	5′ 0″ to 838′ 11″	4′ 0″ to 715′ 1″

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Section in vicinity of Shamokin from coal bed No. XVI to Lykens Valley bed No. II.

No. of strata.	Description.		Thicknesses perpendicular to dip.
1.	COAL BED NO. XVI,		5′ 0″ to 5′ 0″
2.	Strata,		63′ 0″ to 68′ 0′
3.	COAL BED NO. XV,		5′ 0″ to 73′ 0″
4.	Strata,		79′ 0″ to 152′ 0′
5.	COAL BED NO. XIV,		8′ 0″ to 160′ 0″
6.	Strata,		30′ 0″ to 190′ 0″
7.	COAL,		1′ 0″ to 191′ 0″
8.	Strata,		55′ 0′ to 246′ 0″
9.	COAL BED NO. XIII,		6′ 0″ to 252′ 0″
10.	Strata,		70′ 0″ to 322′ 0″
11.	ORCHARD BED NO. XII,		4′ 0″ to 326′ 0″
12.	Sandstone,		50′ 0″ to 376′ 0″
13.	Slate,		65′ 0″ to 441′ 0″
14.	Bone,		2′ 0″ to 443 0″
15.	Slaty sandstone,		65′ 0″ to 508′ 0″
16.	Slate,		4′ 0″ to 512′ 0″
17.	Sandstone,		40′ 0″ to 552′ 0″
18.	PRIMROSE BED NO. XI,		7′ 0″ to 559′ 0″
19.	Slate,		21′ 0″ to 580′ 0″
20.	Slate and sandstone,		56′ 0″ to 636′ 0″
21.	Slate,		20′ 0″ to 656′ 0″
22.	Sandstone and slate,		18′ 0″ to 674′ 0″
23.	Sandstone,		58′ 0″ to 732′ 0″
24.	Slaty sandstone,		13′ 0″ to 745′ 0″
25.	HOLMES BED NO. X,		6′ 0″ to 751′ 0″
26.	Slate,		14′ 0″ to 765′ 0″
27.	Sandstone,		77′ 0″ to 842′ 0″
28.	Bone,		4′ 0″ to 846′ 0″
29.	Sandstone,		71′ 0″ to 917˙ 0″
30.	MAMMOTH BED, UPPER MEMBER,	Nos. VIII & IX.	8′ 0″ to 925′ 0″
31.	Slate,		21′ 0″ to 946′ 0″
32.	MAMMOTH BED, MIDDLE MEMBER,		8′ 0″ to 945′ 0″
33.	Slate,		13′ 0″ to 967′ 0″
34.	MAMMOTH BED, LOWER MEMBER.		5′ 0″ to 972′ 0″
35.	Sandstone,		59′ 0″ to 1031′ 0″
36.	SKIDMORE BED NO. VII,		4′ 0″ to 1035′ 0″
37.	Slate,		8′ 0″ to 1043′ 0″
38.	Sandstone,		10′ 0″ to 1053′ 0″
39.	Slate,		16′ 0″ to 1069′ 0″
40.	SEVEN-FOOT BED NO. VI,		3′ 0″ to 1072′ 0″
41.	Strata,		53′ 0″ to 1125′ 0″
42.	BUCK MOUNTAIN BED NO. V,		3′ 0″ to 1128′ 0″
43.	Strata,		81′ 0″ to 1209′ 0″
44.	COAL BED NO. IV,		3′ 0″ to 1212′ 0″
45.	Strata,		342′ 0″ to 1554′ 0″
46.	LYKENS VALLEY BED NO. II,		3′ 0″ to 1557′ 0″

See Columnar Section Sheet No. I and Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Bear Valley shaft, from surface to coal bed at 152′ 5″.

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No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Wash,	30′ 0″ to 30′ 0″
2.	Slate,	25′ 0″ to 55′ 0″
3.	COAL BED,	3′ 0″ to 58′ 0″
4.	Slate,	3′ 0″ to 61′ 0″
5.	COAL BED,	5′ 0″ to 66′ 0″
6.	Slate and fire clay,	33′ 0″ to 99′ 0″
7.	COAL,	4″ to 99′ 4″
8.	Slate,	24′ 0″ to 123′ 4″
9.	Hard sandstone,	9′ 5″ to 132′ 9″
10.	Slate,	2′ 9″ to 135′ 6″
11.	COAL,	8″ to 136′ 2″
12.	Slate,	1′ 0″ to 137′ 2″
13.	COAL,	2′ 4″ to 139′ 6″
14.	Slate,	8′ 9″ to 148′ 3″
15.	COAL BED,	4′ 2″ to 152′ 5″

See Columnar Section Sheet No. I, and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Diamond Drill bore-hole at Neilson shaft.

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(Average dip 43°.)

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Wash,	25′ 0″ to 25′ 0″	25′ 0″ to 25′ 0″
2.	Sandy slate,	33′ 9″ to 58′ 9″	24′ 8″ to 49′ 8″
3.	Slate,	3′ 7″ to 62′ 4″	2′ 7″ to 52′ 3″
4.	COAL,	1′ 3″ to 63′ 7″	11″ to 53′ 2″
5.	Sandy slate,	18′ 2″ to 81′ 9″	13′ 3″ to 66′ 5″
6.	Sandstone,	3′ 7″ to 85′ 4″	2′ 8″ to 69′ 1″
7.	Sandy slate,	15′ 0″ to 100′ 4″	11′ 0″ to 80′ 1″
8.	Slate,	2′ 2″ to 102′ 6″	1′ 7″ to 81′ 8″
9.	COAL BED No. XIII	8′ 1″ to 110′ 7″	5′ 11″ to 87′ 7″
10.	Slate,	5′ 6″ to 116′ 1″	4′ 0′ to 91′ 7″
11.	Sandy slate,	1′ 0″ to 117′ 1″	9″ to 92′ 4″
12.	Sandstone,	26′ 6″ to 143′ 7″	19′ 4″ to 111′ 8″
13.	Slate,	2′ 10″ to 146′ 5″	2′ 1″ to 113′ 9″
14.	Sandy slate,	33′ 2″ to 179′ 7″	24′ 3″ to 138′ 0″
15.	Slate,	4′ 2″ to 183′ 9″	3′ 0″ to 141′ 0″
16.	COAL BED,	4′ 2″ to 187′ 11″	3′ 0″ to 144′ 0″
17.	Slate,	2 0″ to 189′ 11″	1′ 6″ to 145′ 6″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
18.	Sandstone, ...	67′ 1″ to 257′ 0″	49′ 1″ to 194′ 7″
19.	Sandy slate, . . .	8′ 11″ to 265′ 11″	6′ 6″ to 201′ 1″
20.	Slate and bone, .	3′ 2″ to 269′ 1″	2′ 4″ to 203′ 5″
21.	Sandy slate, . . .	5′ 10″ to 274′ 11″	4′ 3″ to 207′ 8″
22.	Sandstone, ...	27′ 1″ to 302′ 0″	19′ 10″ to 227′ 6″
23.	Sandy slate, . . .	3′ 2″ to 305′ 2″	2′ 3″ to 229′ 9′
24.	Slate, ...	2′ 10″ to 308′ 0″	2′ 1″ to 231 10″
25.	Sandstone, ...	7″ to 308′ 7″	5″ to 232′ 3″
26.	Slate, ...	29′ 0″ to 337′ 7″	21′ 2″ to 253′ 5′
27.	Sandy slate, . . .	2′ 8″ to 340′ 3″	2′ 0″ to 255′ 5″
28.	Sandstone, ...	10′ 1″ to 350′ 4″	7′ 4″ to 262′ 9″
29.	Slate, ...	11′ 10″ to 362′ 2″	8′ 8″ to 271′ 5″
30.	Sandy slate, . . .	6′ 2″ to 368′ 4″	4′ 6″ to 275′ 11″
31.	Slate, ...	3′ 8″ to 372′ 0″	2′ 9″ to 278′ 8″
32.	COAL BED No. XII,	7′ 3″ to 379′ 3″	5′ 4″ to 284′ 0″
33.	Slate, ...	10′ 6″ to 389′ 9″	7′ 8″ to 291′ 8″
34.	Sandstone, ...	57′ 10″ to 447′ 7″	42′ 3″ to 333′ 11″
35.	Slate, ...	10″ to 448′ 5″	7″ to 334′ 6″
36.	COAL, ...	1′ 3″ to 449′ 8″	11″ to 335′ 5″
37.	Slate, ...	2′ 6″ to 452′ 2″	1′ 10″ to 337′ 3″
38.	Sandstone, ...	3′ 0″ to 455′ 2″	2′ 2″ to 339′ 5″
39.	Slate, ...	3′ 7″ to 458′ 9″	2′ 7″ to 342′ 0″
40.	Sandstone, ...	2′ 1″ to 460′ 10″	1′ 6″ to 343′ 6″
41.	Slate, ...	4″ to 461′ 2″	3″ to 343′ 9″
42.	Sandstone, ...	4′ 11″ to 466′ 1″	3′ 7″ to 347′ 4″
43.	Slate, ...	7′ 3″ to 473′ 4″	5′ 3″ to 352′ 7″
44.	Sandy slate, . . .	4′ 5″ to 477′ 9″	3 3″ to 355′ 10″
45.	Slate, ...	8′ 4″ to 486′ 1″	6′ 1″ to 361′ 11″
46.	Sandstone, ...	13′ 7″ to 499′ 8″	9′ 11″ to 371′ 10″
47.	Sandy slate, . . .	9′ to 500′ 5″	7″ to 372′ 5″
48.	Sandstone, ...	8″ to 501′ 1″	6″ to 372′ 11″
49.	Slate, ...	4″ to 501′ 5″	3″ to 373 2″
50.	Sandstone.	3′ 5″ to 504′ 10″	2′ 6″ to 375′ 8″
51.	Sandy slate, . . .	7′ 5″ to 512′ 3″	5′ 5″ to 381′ 1″
52.	Slate, ...	2′ 7″ to 514′ 10″	1′ 10″ to 382′ 11″
53.	Bone, ...	1″ to 514′ 11″	1″ to 383′ 0″
54.	Slate, ...	2′ 11″ to 517′ 10″	2′ 2″ to 385′ 2″
55.	Sandy slate, . . .	3′ 5″ to 521′ 3″	2′ 6″ to 387′ 8″
56.	Sandstone, ...	2′ 5″ to 523′ 8″	1′ 9″ to 389′ 5″
57.	Sandy slate, . . .	47′ 4″ to 571′ 0″	34′ 7″ to 424′ 0″
58.	Sandstone, ...	4′ 6″ to 575′ 6″	3′ 3″ to 427′ 3″
59.	Sandy slate, . . .	11′ 1″ to 586′ 7″	8′ 1″ to 435′ 4″
60.	Slate, ...	1′ 7″ to 588′ 2″	1′ 2″ to 436′ 6″
61.	Sandy slate, . . .	3′ 7″ to 591′ 9″	2′ 8″ to 439′ 2″
62.	Sandstone.	50′ 8″ to 642′ 5″	37′ 0″ to 476′ 2″
63.	Slate, ...	1 5″ to 643′ 10″	1′ 1″ to 477′ 3″
64.	Sandy slate, . . .	18′ 7″ to 662′ 5″	13′ 7″ to 490′ 10″
65.	Slate, ...	8′ 4″ to 670′ 9″	6′ 1″ to 496′ 11″
66.	COAL BED No. XI,	6′ 7′ to 677′ 4″	4′ 10″ to 501′ 9″
67.	Slate, ...	1′ 2″ to 678′ 6″	10″ to 502′ 7″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
68.	Sandy slate, . . .	24′ 3″ to 702′ 9″	17′ 9′ to 520′ 4″
69.	Slate, ...	8″ to 703′ 5″	6″ to 520′ 10″
70.	Sandy slate, . . .	91′ 3″ to 794′ 8″	66′ 8″ to 587′ 6″
71.	Slate, ...	5′ 3″ to 799′ 11″	3′ 10″ to 591′ 4″
72.	COAL, ...	1′ 4″ to 801′ 3″	1′ 0″ to 592′ 4″
73.	Slate, ...	7′ 4″ to 808′ 7″	5′ 4″ to 597′ 8″
74.	Sandstone, ...	1′ 8″ to 810′ 3″	1′ 3″ to 598′ 11″
75.	Slate, ...	1′ 2′ to 811′ 5″	10″ to 599′ 9″
76.	Sandstone, ...	1′ 4″ to 812′ 9″	1′ 0″ to 600′ 9′
77.	Sandy slate, . . .	5′ 4″ to 818′ 1″	3′ 11″ to 604′ 8″
78.	Sandstone, ...	14′ 8″ to 832′ 9″	10′ 9″ to 615′ 5″
79.	Conglomerate, . .	46′ 7″ to 879′ 4′	34′ 1″ to 649′ 6″
80.	Slate, ...	11′ 9″ to 891′ 1″	8′ 6″ to 658′ 0″
81.	COAL BED No. X,	9′ 5″ to 900′ 6″	6′ 10′ to 664′ 10″
82.	Slate, ...	4′ 4″ to 904′ 10″	3′ 2″ to 668′ 0″
83.	Sandy slate, . . .	4′ 6″ to 909′ 4″	3· 3″ to 671′ 3″
84.	Sandstone, ...	12′ 11″ to 922′ 3″	9′ 5″ to 680′ 8″
85.	Sandy slate, . . .	6″ to 922′ 9″	4″ to 681′ 0″
86.	Slate, ...	3′ 0″ to 925′ 9″	2′ 2″ to 683′ 2″
87.	Sandstone, ...	5″ to 926′ 2″	4″ to 683′ 6″
88.	Slate, ...	1′ 5″ to 927′ 7″	1′ 1″ to 684′ 7″
89.	COAL BED, ...	2′ 7″ to 930′ 2″	1′ 11″ to 686′ 6″
90.	Slate, ...	5′ 6″ to 935′ 8″	4′ 0″ to 690′ 6″
91.	Sandy slate, . . .	27′ 5″ to 963′ 1″	20′ 1″ to 710′ 7″
92.	Sandstone, ...	18′ 0″ to 981′ 1″	13′ 2″ to 723′ 9″
93.	Sandy slate, . . .	11′ 10″ to 992′ 11″	8′ 8″ to 732′ 5″
94.	Sandstone, ...	38′ 6″ to 1031′ 5′	28′ 2″ to 760′ 7′
95.	Slate, ...	6′ 5″ to 1037′ 10″	4′ 8″ to 765′ 3″
96.	Sandstone, ...	30′ 0″ to 1067′ 10″	21′ 11″ to 787′ 2″
97.	Slate, ...	1′ 10″ to 1069′ 8″	1′ 4″ to 788′ 6″
98.	Sandstone, ...	24′ 9″ to 1094′ 5″	18′ 1″ to 806 7″
99.	Slate, ...	5″ to 1094′ 10″	4″ to 806′ 11″
100.	Sandy slate, . . .	23′ 6″ to 1118′ 4″	17′ 2″ to 824′ 1″
101.	Sandstone, ...	6′ 8″ to 1125′ 0″	4′ 10″ to 828′ 11″
102.	Shelly slate, . . .	5′ 9″ to 1130′ 9″	4′ 3″ to 833′ 2″
103.	Sandy slate, . . .	37 11″ to 1168′ 8″	27′ 9″ to 860′ 11″
104.	Soft slate, ...	5′ 9″ to 1174′ 5″	4′ 2″ to 865′ 1″
105.	Sandy slate, . . .	34′ 11″ to 1209′ 4″	25′ 6″ to 890′ 7″
106.	Sandstone, ...	12′ 7″ to 1221′ 11″	9′ 3″ to 899′ 10″
107.	Conglomerate, . .	3′ 4″ to 1225′ 3″	2′ 5′ to 902′ 3″
108.	Sandstone, ...	8 3″ to 1233′ 6″	6′ 1″ to 908′ 4″
109.	Conglomerate, .	7′ 3″ to 1240′ 9″	5′ 4″ to 913′ 8″
110.	Sandy slate, . . .	35′ 8″ to 1276′ 5″	26′ 1″ to 939′ 9″
111.	COAL BED, ...	4′ 11″ to 1281′ 4″	3′ 7″ to 943′ 4″
112.	Slate, ...	4″ to 1281′ 8″	3″ to 943′ 7″
113.	Sandy slate, . . .	13′ 5″ to 1295′ 1″	9′ 10″ to 953′ 5″
114.	Sandstone, ...	5′ 8″ to 1300′ 9″	4′ 2″ to 957′ 7″
115.	Sandy slate, . . .	11″ to 1301′ 8″	8″ to 958′ 3″
116.	Slate, ...	5′ 6″ to 1307′ 2″	4′ 0″ to 962′ 3″
117.	Sandy slate, . . .	30′ 7″ to 1337′ 9″	22′ 4″ to 984′ 7″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
118.	Sandstone, ...	2′ 8′ to 1340′ 5″	1′ 11″ to 986′ 6
119.	Conglomerate, . .	5′ 8″ to 1346′ 1″	4′ 2″ to 990′ 8″
120.	COAL BED, ...	5′ 2″ to 1351′ 3″	3′ 9″ to 994′ 5″
121.	Slate, ...	5′ 1″ to 1356′ 4″	3′ 9′ to 998′ 2″
122.	Sandy slate, . . .	3′ 10″ to 1360′ 2″	2′ 9″ to 1000′ 11′
123.	Sandstone, . . .	8′ 5″ to 1368′ 7″	6′ 2″ to 1007′ 1″
124.	Sandy slate, . . .	9′ 6″ to 1378′ 1″	6′ 11″ to 1014′ 0″
125.	Sandstone, ...	1′ 5″ to 1379′ 6″	1′ 0′ to 1015′ 0″
126.	Hard sandstone, .	9′ 6″ to 1389′ 0″	6′ 11″ to 1021′ 11′
127.	Sandy slate, . . .	8′ 6″ to 1397′ 6″	6′ 3″ to 1028′ 2″
128.	Sandstone, . . .	20′ 6″ to 1418′ 0″	15′ 0″ to 1043′ 2″
129.	Sandy slate, . . .	6″ to 1418′ 6″	4″ to 1043′ 6″
130.	Sandstone, ...	4′ 8″ to 1423′ 2″	3′ 5″ to 1046′ 11″
131.	Slate, ...	2′ 6″ to 1425′ 8″	1′ 10″ to 1048′ 9′
132.	COAL, ...	1′ 0″ to 1426′ 8″	9″ to 1049′ 6″
133.	Sandy slate, . . .	1′ 4″ to 1428′ 0″	1′ 0″ to 1050′ 6″
134.	Sandstone, ...	12′ 6″ to 1440′ 6″	9′ 2″ to 1059′ 8″
135.	Sandy slate, . . .	27′ 0″ to 1467′ 6″	19′ 9″ to 1079′ 5″
136.	Sandstone, ...	9′ 5″ to 1476′ 11″	6′ 10″ to 1086′ 3″
137.	Slate, ...	8″ to 1477′ 7″	6″ to 1086′ 9″
138.	Sandy slate, . . .	5′ 6″ to 1483′ 1″	4′ 0″ to 1090′ 9″
139.	Sandstone, ...	42′ 0″ to 1525′ 1″	30′ 8″ to 1121′ 5″
140.	Sandy slate, . . .	5′ 6″ to 1530′ 7″	4′ 0″ to 1125′ 5″
141.	Sandstone, ...	7′ 5″ to 1538′ 0″	5′ 5″ to 1130′ 10″

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Neilson colliery tunnel in counter level from No. XII to to No. XI bed.

A. Langdon & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	No. XII BED. Dip 32° S., ...	9′ 3″ to 9′ 3″	4′ 10″ to 4′ 10″
2.	Hard black slate, .	37′ 4″ to 46′ 7″	21′ 10″ to 26′ 8″
3.	Hard sandstone , .	17′ 10″ to 64′ 5″	11′ 6″ to 38′ 2″
4.	COAL, ...	1′ 1″ to 65′ 6″	9″ to 38′ 11″
5.	Hard black slate, .	20′ 5′ to 85′ 11″	14′ 2″ to 53′ 1″
6.	Hard sandstone, .	49′ 1″ to 135′ 0″	36′ 6″ to 89′ 7″
7.	COAL. Dip 52° S.,	1′ 3″ to 136′ 3″	1′ 0″ to 90′ 7″
8.	Hard sandstone, .	22′ 0″ to 158′ 3″	17′ 7″ to 108′ 2″
9.	Sandstone, ...	24′ 6″ to 182′ 9″	20′ 1″ to 128′ 3″
10.	Hard sandstone, .	27′ 6″ to 210′ 3″	23′ 1″ to 151′ 4″
11.	Dirt, ...	1′ 0″ to 211′ 3″	10″ to 152′ 2″
12.	Slate, sandstone and fire clay, ...	46′ 4″ to 257′ 7″	40′ 8″ to 192′ 10″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
13.	COAL. Dip 61° S.,	2′ 1″ to 259′ 8″	10′ to 193′ 8″
14.	Hard sandstone, .	43′ 5′ to 303′ 1″	38′ 0″ to 231′ 8″
15.	COAL, slate and dirt,	6′ 2″ to 309′ 3″	5′ 5″ to 237′ 1″
16.	Slate, ...	1′ 6″ to 310 9″	1′ 4″ to 238 5″
17.	COAL, ...	2 0″ to 312′ 9″	1′ 9″ to 240′ 2″
18.	Slate, ...	2′ 2″ to 314′ 11″	1′ 11″ to 242′ 1″
19.	Slate, ...	19′ 0′ to 333′ 11″	18′ 6″ to 260 7″
20.	COAL BED No. XI,	1′ 7″ to 335′ 6″	1′ 6″ to 262′ 1″

See Columnar Section Sheet No. VII and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Neilson shaft, from surface to 67′ 4″ below No. X bed.

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No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Strata, ...	44′ 2″ to 44′ 2″	27′ 10″ to 27′ 10″
2.	COAL BED. Dip 51° S., ...	9′ 6″ to 53′ 8″	6′ 0″ to 33′ 10″
3.	Strata. Dip 60° S., ...	141′ 2″ to 194 10″	70′ 2″ to 104 0″
4.	COAL BED, . .	8′ 5″ to 203′ 3″	5′ 3″ to 109′ 3″
5.	Strata, ...	67′ 0″ to 270′ 3″	54′ 10″ to 164′ 1″
6.	COAL BED, . .	3′ 4″ to 273′ 7″	2′ 9″ to 166′ 10″
7.	Strata, ...	111′ 11″ to 385′ 6″	96′ 11″ to 263′ 9″
8.	No. XII BED. Dip 29° S., .	11′ 1″ to 396′ 7″	9′ 8″ to 273′ 5″
9.	Strata, ...	194′ 3″ to 590′ 10″	166′ 5″ to 439′ 10″
10.	COAL. Dip 32° S., ...	1′ 0″ to 591′ 10″	10″ to 440′ 8″
11.	Strata.	54′ 5′ to 646′ 3″	46′ 1″ to 486′ 9″
12.	COAL, ...	2′ 4″ to 648′ 7″	2 1″ to 488′ 10″
13.	Strata, ...	48′ 3″ to 696′ 10″	40′ 10″ to 529′ 8″
14.	COAL, ...	2′ 10″ to 699′ 8″	2′ 6″ to 532′ 2″
15.	Strata, ...	11′ 2″ to 710′ 10″	9′ 6″ to 541′ 8″
16.	No. XI BED. Dip 32° S., .	7′ 4″ to 718′ 2″	6′ 3″ to 547′ 11″
17.	Strata, ...	204′ 8′ to 922′ 10″	171′ 9″ to 719′ 8″
18.	No. X BED. Dip 34° S., .	9′ 5″ to 932′ 3″	9′ 7″ to 729′ 3″
19.	Strata, ...	81′ 3″ to 1013′ 6″	67′ 4″ to 796′ 7″

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

This section was measured June 16th, 1887, during progress of sinking.

Tunnel at foot of outside slope from No. X to No. IX bed Cameron colliery.

Mineral Railroad and Mining Co.

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	No. X BED. Dip 73° S.,	7' 7'' to 7' 7''	7' 3'' to 7' 3''
2.	Sandy slate,	3' 5'' to 11' 0''	3' 3'' to 10' 6''
3.	COAL BED,	21' 0'' to 32' 0''	20' 1'' to 30' 7''
4.	Slate,	14' 7'' to 46' 7''	14' 2'' to 44' 9''
5.	Hard sandstone. Dip 78° S.,	81' 6'' to 128' 1''	79' 8'' to 124' 5''
6.	No. IX BED. Dip 63° S.,	2' 11'' to 131' 0''	2' 6'' to 126' 11''

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Cameron colliery tunnel, 70 yards east of the foot of the outside slope.

Mineral Railroad & Mining Co.

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	No. IX BED. Dip 27° S.,	15' 0'' to 15' 0''	6' 8'' to 6' 8'
2.	Slate,	16' 0' to 31' 0''	8' 7'' to 15' 3''
3.	Sandstone,	6' 0'' to 37' 0''	3' 8'' to 18' 11''
4.	Slate,	3' 0'' to 40' 0''	2' 0'' to 20' 11'
5.	No. VIII BED. Dip 45° S.,	15' 0'' to 55' 0''	10' 6'' to 31' 5''
6.	Slate,	8' 0'' to 63' 0''	5' 5'' to 36' 10''
7.	No. VII½ BED. Dip 43° S.,	10' 2'' to 73' 2''	6' 10'' to 43' 8''
8.	Slate,	6' 10'' to 80' 0''	5' 3'' to 48' 11''
9.	Hard sandstone. Dip 60° S.,	111' 0'' to 191' 0''	96' 1'' to 145' 0''
10.	Slate,	6' 0'' to 197' 0'	5' 0'' to 150' 0''
11.	No. VII BED. Dip 45° S.,	7' 3' to 204' 3''	5' 1'' to 155' 1'
12.	Slate,	24' 2'' to 228' 5''	17' 7'' to 172' 8'
13.	No. VI BED. Dip 48° S.,	9' 3'' to 237' 8''	6' 9'' to 179' 5''
14.	Slate,	5' 6'' to 243' 2''	4' 0'' to 183' 5''
15.	COAL and slate,	2' 10'' to 246' 0''	2' 0'' to 185' 5'
16.	Slate,	19' 0'' to 265' 0''	13' 2'' to 198' 7

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
17.	Hard sandstone, . .	22′ 6″ to 287′ 6″	15′ 2″ to 213′ 9″
18.	COAL. Dip 40° S., .	2′ 6″ to 290′ 0″	1′ 6″ to 215′ 3″
19.	Slate and sandstone,	20′ 6″ to 310′ 2″	13′ 8″ to 228′ 11″
20.	Sandstone, ...	13′ 6″ to 323′ 8″	9′ 4″ to 238′ 3″
21.	Slate, bone and COAL,	2′ 4″ to 326′ 0″	1′ 7″ to 239′ 10″
22.	Slate, ...	6′ 0″ to 332′ 0′	4′ 5″ to 244′ 3″
23.	Sandstone, ...	87′ 4″ to 419′ 4″	67′ 9′ to 312′ 0″
24.	Slate, ...	2′ 0″ to 421′ 4″	1′ 7″ to 313′ 7″
25.	Slate and bone, . .	1′ 1″ to 422′ 5″	9″ to 314′ 4″
26.	No. IV BED. Dip 58° S,	2′ 7″ to 425′ 0″	2′ 2″ to 316′ 6″

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Luke Fiddler colliery, tunnel from foot of slope to No. IX bed.

Mineral Railroad and Mining Company.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	COAL, ...	10″ to 10″	4″ to 4″
2.	Slate, ...	6′ 7″ to 7′ 5″	2′ 7′ to 2′ 11″
3.	COAL, ...	2′ 2″ to 9 7″	10″ to 3′ 9″
4.	Slaty sandstone, Dip 23° S., . .	10′ 0″ to 19′ 7′	3′ 11′ to 7′ 8″
5.	Hard gray SS. Dip 34° S., . .	76′ 0″ to 95′ 7″	39′ 9″ to 47′ 5″
6.	Hard dark slate,.	4′ 0″ to 99′ 7″	2′ 3″ to 49′ 8″
7.	Hard gray SS., .	15′ 0″ to 114′ 7″	8′ 0″ to 57′ 8′
8.	No. XII BED. Dip 31° S., ...	12′ 0″ to 126′ 7″	7 3″ to 64′ 11″
9.	Slaty sandstone,	17′ 0″ to 143′ 7″	8′ 9″ to 73′ 8″
10.	Hard gray SS., .	19′ 0″ to 162′ 7″	9′ 6″ to 83′ 2″
11.	Sandy slate, . .	21′ 0″ to 183′ 7″	10′ 2″ to 93′ 4″
12.	Hard gray SS., .	20′ 0″ to 203′ 7″	9′ 5″ to 102′ 9″
13.	Hard slate. Dip 27° S., ...	4′ 0″ to 207′ 7″	1′ 10″ to 104′ 7″
14.	Hard sandstone,	44′ 0″ to 251′ 7″	20′ 8″ to 125′ 3″
15.	Slate, ...	2′ 0″ to 253′ 7″	1′ 0″ to 126 3″
16.	Hard, coarse silicious sandstone,	40′ 0″ to 293′ 7″	20′ 0″ to 146′ 3″
17.	Soft slate. Dip 31° S., ...	7′ 0″ to 300′ 7″	3′ 7″ to 149′ 10″
18.	Hard slaty SS. Dip 32° S., . .	104′ 0″ to 404′ 7″	55′ 1″ to 204′ 11″
19.	Slate and SS., .	16′ 0″ to 420′ 7″	8′ 6″ to 213′ 5″
20.	Hard sandstone,	42′ 0′ to 462′ 7″	22′ 11″ to 236′ 4″
21.	Sandy slate, . .	8′ 0″ to 470′ 7″	4′ 6″ to 240′ 10″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
22.	No. XI BED. Dip 35° S., ...	22′ 0″ to 492′ 7″	12′ 7″ to 253′ 5″
23.	Slate and SS., .	40′ 0″ to 532′ 7″	27 0″ to 280′ 5″
24.	Slate and bone,	1′ 10″ to 534′ 5″	1′ 1″ to 281′ 6″
25.	Hard sandstone,	30′ 2″ to 564′ 7″	15′ 7″ to 297′ 1″
26.	Hard slate. Dip 29° S., ...	4′ 0″ to 568′ 7″	1′ 11″ to 299′ 0″
27.	Hard sandstone, Dip 17½° S., . .	154′ 0″ to 722′ 7″	52′ 8″ to 351′ 8″
28.	COAL BED. Dip 18° S., ...	3′ 6″ to 726′ 1″	1′ 1″ to 352′ 9″
29.	Sandy slate, . .	55′ 6″ to 781′ 7″	13′ 5″ to 366′ 2″
30.	COAL and bone. Dip 10° S., . .	2′ 6″ to 784′ 1″	1′ 0″ to 367′ 2″
31.	Slate and SS., .	35′ 6″ to 819′ 7″	6′ 9″ to 373′ 11″
32.	Hard sandstone,	86′ 0″ to 905′ 7″	16′ 5″ to 390′ 4″
33.	Hard black slate with iron ore balls, ...	33′ 0″ to 938′ 7″	6′ 10″ to 397′ 2″
34.	Hard sandstone,	114′ 0″ to 1052′ 7″	25′ 8″ to 422′ 10″
35.	Hard sandy slate,	34′ 0″ to 1086 7″	8′ 3″ to 431′ 1″
36.	COAL, ...	8″ to 1087′ 3″	2″ to 431′ 3″
37.	Hard slate, . . .	24′ 4″ to 1111′ 7″	5′ 10″ to 437′ 1″
38.	No. X BED. Dip 15° S., ...	20′ 0″ to 1131′ 7″	5′ 1″ to 442′ 2″
39.	Slate, ...	27′ 0″ to 1158′ 7″	7′ 0″ to 449′ 2″
40.	COAL, ...	3′ 2″ to 1161′ 9″	1′ 4″ to 450′ 6″
41.	Hard black slate with iron ore balls, ...	21′ 10″ to 1183′ 7″	5′ 3″ to 455′ 9″
42.	Slate with streaks of bone,	9′ 0″ to 1192′ 7″	2′ 0″ to 457′ 9″
43.	Hard black slate with iron ore balls, ...	58′ 0″ to 1250′ 7″	12′ 1″ to 469′ 10″
44.	Slate and bone. Dip 11° S., . .	9′ 0″ to 1259′ 7″	1′ 9″ to 471′ 7″
45.	Hard black slate with iron ore balls. Dip 17° S,	192′ 0″ to 1451′ 7″	53′ 0″ to 524′ 7″
46.	SS. and slate, .	48′ 0″ to 1499′ 7″	13′ 3″ to 537′ 10″
47.	Slate with streaks of bone,	3′ 6″ to 1503′ 1″	1′ 0″ to 538′ 10″
48.	Soft slate, . . .	28′ 6″ to 1531′ 7″	7′ 0″ to 545′ 10″
49.	SS. and cong., .	329′ 0″ to 1860′ 7″	90′ 10″ to 636′ 8″
50.	Hard slaty SS., .	13′ 0″ to 1873′ 7″	3′ 7″ to 640′ 3″
51.	Hard slate. Dip 16° S., ...	47′ 0″ to 1920′ 7″	13′ 0″ to 653′ 3″
	No. IX BED.		

See Columnar Section Sheet No. I, Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Cameron colliery tunnel 100 yards west of bottom of outside slope, from No. XII bed to No. X bed.

Mineral Railroad and Mining Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Hard slate, ...	4′ 5″ to 4′ 5″	4′ 3″ to 4′ 3″
2.	Coal, slate and SS.,	7′ 0″ to 11′ 5″	6′ 9″ to 11′ 0″
3.	Sandstone, ...	16′ 0″ to 27′ 5″	15′ 6″ to 26′ 6″
4.	Slate, ...	5′ 3″ to 32′ 8″	5′ 1″ to 31′ 7″
5.	Coal dirt, ...	9″ to 33′ 5″	8″ to 32′ 3′
6.	Sandstone, ...	13′ 7″ to 47′ 0″	13′ 3″ to 45′ 6″
7.	Coal and slate. Dip 76° S., . . .	50′ 11″ to 97′ 11″	4′ 0″ to 49′ 6″
8.	SS. Dip 67° S., . .	55′ 6″ to 153′ 5″	51′ 2″ to 100′ 8″
9.	Dirt, ...	1′ 0″ to 154′ 5″	9″ to 101′ 5′
10.	Slate. Dip 58° S., .	72′ 7″ to 227′ 0″	61′ 6″ to 162′ 11″
11.	Coal, bone and slate, ...	2′ 5″ to 229′ 5″	2′ 1″ to 165′ 0″
12.	Slate and sandstone,	72′ 0″ to 301′ 5″	62′ 3″ to 227′ 3″
13.	Slate, ...	5′ 0″ to 306′ 5″.	4′ 4″ to 231′ 7″
14.	Dirt, ...	5″ to 306′ 10″	5″ to 232′ 0″
15.	Hard SS. Dip 65° S.,	44′ 2″ to 351′ 0″	40′ 1″ to 272′ 1″
16.	No. XI bed, . . .	10′ 2″ to 361′ 2″	7′ 6″ to 279′ 7″
17.	Slate, ...	23, 0″ to 384′ 2″	21′ 5″ to 301′ 0″
18.	Coal and bone. Dip 70° S., . . .	1′ 5″ to 385′ 7″	5″ to 301′ 5″
19.	Hard slate and SS.,	58′ 4″ to 443′ 4″	54′ 9″ to 356′ 2″
20.	Slate, ...	21 3″ to 465′ 2″	20′ 0″ to 376′ 2″
21.	Coal and bone, . .	1′ 7″ to 466′ 9″	9″ to 376′ 11″
22.	Hard sandy slate. Dip 73° S., . . .	20′ 0″ to 486′ 9″	19′ 1″ to 396′ 0″
23.	Hard sandstone, . .	65′ 5″ to 552′ 2″	61′ 1″ to 457′ 1″
24.	Slate and slaty SS.,	14′ 7″ to 566′ 9″	13′ 3″ to 470′ 4″
25.	No. X bed. Dip 62° S., ...	10′ 5″ to 577′ 2″	9′ 2″ to 479′ 6″

See Columnar Section Sheet No. I and Mine Sheet No. VII, Atlas Western Middle Anthracite Field, Part II.

Hickory Swamp colliery, inside Water Level tunnel from No. X bed north.

Union Coal Company.

(Measured by Geological Survey.)

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	No. X BED. Dip 61° S.,	5′ 2″ to 5′ 2″	3′ 6″ to 3′ 6″
2.	Very hard slate,	13′ 10″ to 19′ 0″	13′ 3″ to 16′ 9″
3.	COAL,	9″ to 19′ 9″	1′ 4″ to 18′ 1″
4.	Hard slate,	9′ 0″ to 28′ 9″	8′ 1″ to 26′ 2″
5.	COAL,	1′ 9″ to 30′ 6″	1′ 4″ to 27′ 6″
6.	Sandstone,	20′ 0″ to 50′ 6″	18′ 3″ to 45′ 9″
7.	Slate,	2′ 6″ to 53′ 0′	2′ 3″ to 48′ 0″
8.	COAL,	9″ to 53′ 9″	9″ to 48′ 9″
9.	Sandstone,	18′ 5″ to 72′ 2″	17′ 2″ to 65′ 11″
10.	COAL,	1′ 8″ to 73′ 10″	1′ 7″ to 67′ 6″
11.	Sandstone,	1′ 3″ to 75′ 1″	1′ 2″ to 68′ 8″
12.	COAL,	2′ 0″ to 77′ 1″	1′ 1″ to 69′ 9″
13.	Hard sandstone,	102′ 3″ to 179′ 4″	98′ 3″ to 168′ 0″
14.	No. IX BED,	5′ 2″ to 184′ 6″	5 0″ to 173′ 0″
15.	Slate,	7′ 0″ to 191′ 6″	6′ 10″ to 179′ 10″
16.	No. VIII BED. Dip 79° S.,	2′ 0″ to 193′ 6″	2′ 0″ to 181′ 10″
17.	Slate,	3′ 8″ to 197′ 2″	3′ 7″ to 185′ 5″
18.	COAL,	7″ to 197′ 9″	7″ to 186′ 0″
19.	Slate,	2′ 9″ to 200′ 6″	2′ 8″ to 188′ 8″
20.	Hard sandstone,	73′ 11″ to 274′ 5″	69′ 1″ to 257′ 9″
21.	COAL. Dip 71° S.,	1′ 1″ to 275′ 6″	1′ 0″ to 258′ 9″
22.	Hard sandstone,	23′ 7″ to 299′ 1′	22′ 3″ to 281′ 0″
23.	Hard slaty SS.,	3′ 7″ to 302′ 8″	3′ 5″ to 284′ 5″
24.	Slate,	1′ 8″ to 304′ 4″	1′ 7″ to 286′ 0″
25.	COAL and slate. Dip 70° S.,	1′ 2″ to 305′ 6′	11″ to 286′ 11″
26.	Slate,	1′ 0″ to 306′ 6″	11″ to 287′ 10″
27.	Hard sandstone,	54′ 8″ to 361′ 2″	50′ 0″ to 337′ 10″
28.	COAL and slate. Dip 62° S.,	3′ 6″ to 364′ 8″	2′ 4″ to 340′ 2″
29.	Sandstone,	6′ 5″ to 371′ 1″	5′ 8″ to 345′ 10″
30.	Dirt,	9″ to 371′ 10″	8″ to 346′ 6″
31.	Hard sandstone,	10 7″ to 382′ 5″	9′ 4″ to 355′ 10″
32.	COAL,	2′ 9″ to 385′ 2″	1′ 5″ to 357′ 3″
33.	Hard sandstone,	25′ 8″ to 410′ 10″	22′ 6″ to 379′ 9″
34.	COAL, dirt and slate. Dip 61° S.,	7′ 0″ to 417′ 10″	5′ 9″ to 385′ 6″
35.	Slate,	1′ 0″ to 418′ 10″	10″ to 386′ 4″
36.	Sandstone,	4′ 8″ to 423′ 6″	4′ 1″ to 390′ 5″
37.	Hard slate,	5′ 0″ to 428′ 6″	4′ 4″ to 394′ 9″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
38.	**Sandstone,**	9′ 0″ to 437′ 6″	7′ 10″ to 402′ 7″
39.	**Slate,**	8″ to 438′ 2″	8″ to 403′ 3″
40.	**Hard sandstone,** .	62′ 4″ to 500′ 6″	54′ 6″ to 457′ 9″

See Columnar Section Sheet No. I and Mine Sheet No. X Atlas Western Middle Anthracite Field, Part II.

Hickory Ridge colliery, tunnel at foot of No. 2 slope from 91′ above No. IX bed No. VI bed.

Union Coal Company.

No. of strata.	*Description.*	*Thicknesses meas- horizontally.*	*Thicknesses perpendicular to dip.*
1.	**Hard sandy slate,** .	34′ 4″ to 34′ 4″	22′ 0″ to 22′ 0″
2.	**COAL. Dip 40° N.,** .	11″ to 35′ 3″	7″ to 22′ 7″
3.	**Hard sandstone,** .	103′ 3″ to 138′ 6′	68′ 5″ to 91′ 0″
4.	**No. IX BED. Dip 41° N.,**	10′ 0″ to 148′ 6″	6′ 6″ to 97′ 6″
5.	**Hard sandy slate,** .	7′ 4″ to 155′ 10″	4′ 9″ to 102′ 3″
6.	**No. VIII BED. Dip 42° N.,**	15′ 2″ to 171′ 0″	10′ 2″ to 112′ 5′
7.	**Slate,**	8′ 0″ to 179′ 0″	5′ 0″ to 117′ 5″
8.	**Hard SS. Dip 44° N.,**	100′ 10″ to 279′ 10″	70′ 1″ to 187′ 6″
9.	**Slate,**	2′ 4″ to 282′ 2″	1′ 5″ to 188′ 11″
10.	**COAL. Dip 45° N.,** .	1′ 10″ to 284′ 0″	1′ 3″ to 190′ 2″
11.	**Hard, black, sandy slate. Dip 46° N.,**	63′ 2″ to 347′ 2″	45′ 5″ to 235′ 7″
12.	**Hard SS. Dip 47° N.,**	93′ 6″ to 440′ 8″	68′ 4″ to 303′ 11″
13.	**No. VII BED. Dip 49° N.,**	3′ 7″ to 443′ 3″	2′ 8″ to 306′ 7″
14.	**Slate,**	3′ 3″ to 447′ 6″	2′ 5″ to 309′ 0″
15.	**Slaty SS. Dip 48° N.,**	18′ 7″ to 466′ 1′	13′ 8″ to 322′ 8″
16.	**COAL,**	1′ 11″ to 468′ 0″	1′ 5″ to 324′ 1″
17.	**Hard slate. Dip 47° N.,**	8′ 10″ to 476′ 10″	6′ 5″ to 330′ 6″
18.	**Hard sandstone,** . .	69′ 4″ to 546′ 2″	50′ 7″ to 381′ 1″
19.	**No. VI BED. Dip 46° N.,**	7′ 6″ to 553′ 8″	5′ 5″ to 386′ 6″

See Columnar Section Sheet No. II and Mine Sheet No. X, Atlas Western Middle Anthracite Field, Part II.

Hickory Ridge colliery, tunnel at foot of slope No. 1, from No. VIII to 4′ 8″ below No. VI.

Union Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	No. VIII BED. Dip 70° S.,	7′ 7″ to 7′ 7″	7′ 2″ to 7′ 2″
2.	Slate,	1′ 4″ to 8′ 11″	1′ 3″ to 8′ 5″
3.	COAL and slate,	1′ 10″ to 10′ 9″	1′ 6″ to 9′ 11′
4.	Slate,	3′ 1″ to 13′ 10″	2′ 8″ to 12′ 7″
5.	Hard sandstone,	63′ 4″ to 77′ 2″	57′ 10″ to 70′ 5″
6.	COAL,	3″ to 77′ 5″	3″ to 70′ 8″
7.	Hard sandstone,	12′ 3″ to 89′ 8″	11′ 2″ to 81′ 10″
8.	Slate,	1′ 8″ to 91′ 4″	1′ 6″ to 83′ 4″
9.	COAL and dirt,	8″ to 92′ 0″	7″ to 83′ 11″
10.	Slaty SS. Dip 63° S.,	22′ 8″ to 114′ 8″	20′ 3″ to 104′ 2″
11.	Hard sandstone,	67′ 2″ to 181′ 10″	59′ 10″ to 164′ 0″
12.	COAL, slate and dirt,	11″ to 182′ 9″	9″ to 164′ 9″
13.	Hard slate,	6′ 10″ to 189′ 7″	6′ 2″ to 170′ 11″
14.	Hard sandstone,	32′ 6″ to 222′ 1″	29′ 1″ to 200′ 0″
15.	COAL. Dip 64° S.,	2′ 4″ to 224′ 5″	2′ 1″ to 202′ 1″
16.	Slate,	6′ 11″ to 231′ 4″	6′ 3″ to 208′ 4″
17.	COAL, slate and bone,	1′ 8″ to 233′ 0″	1′ 6″ to 209′ 10″
18.	Slate,	2′ 1″ to 235′ 1′	1′ 10″ to 211′ 8″
19.	Dirt,	3″ to 235′ 4′	3″ to 211′ 11″
20.	Hard sandstone,	63′ 8″ to 299′ 0′	57′ 6″ to 269′ 5″
21.	Slate and dirt,	11″ to 299′ 11″	9″ to 270′ 2″
22.	Hard slate,	20′ 5″ to 320′ 4″	18′ 5″ to 288′ 7″
23.	No. VI BED. Dip 65° S.,	3′ 4″ to 323′ 8″	2′ 11″ to 291′ 6″
24.	Hard slate,	5′ 4″ to 329′ 0″	4′ 8″ to 296′ 2″

See Columnar Section Sheet No. II, Mine Sheet No. X, Atlas Western Middle Anthracite Field, Part II.

Hickory Ridge colliery, Water Level tunnel, from surface to 78′ 3″ below No. VI bed.

Union Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Timber,	41′ 6″ to 41′ 6″	25′ 6″ to 25′ 6″
2.	Sandstone,	47′ 2″ to 88′ 8″	29′ 2″ to 54′ 8″
3.	Slate,	2′ 3″ to 90′ 11″	1′ 5″ to 56′ 1″
4.	Hard sandstone,	9′ 11″ to 100′ 10″	6′ 1″ to 62′ 2″
5.	Slate,	3′ 8″ to 104′ 6″	2′ 4″ to 64′ 6″
6.	Sandstone,	32′ 4″ to 136′ 10″	20′ 0″ to 84′ 6′

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
7.	COAL and dirt. Dip 38° N., ...	5' 0' to 141' 10''	3' 1'' to 87' 7''
8.	Hard sandy slate,	12' 6'' to 154' 4''	7' 8'' to 95' 8''
9.	Soft SS. with iron ore balls, . . .	3' 0'' to 157' 4''	1' 9'' to 97' 0''
10.	Slaty sandstone, .	24' 10'' to 182' 2''	15' 0'' to 112' 0''
11.	Hard slate, . . .	17' 2'' to 199' 4''	11' 0'' to 123' 0''
12.	Soft slate. Dip 35° N., ...	2' 0'' to 201' 4''	1' 2'' to 124' 2''
13.	Fire clay, ...	10' 0'' to 211' 4''	5' 8'' to 129' 10''
14.	Hard sandstone, .	164' 0'' to 375' 4''	94' 1'' to 223' 11''
15.	Hard slate, . .	5' 7'' to 380' 11''	3' 2'' to 227' 1''
16.	COAL BED, . . .	5' 5'' to 386' 4''	3' 1'' to 230' 2''
17.	Slate, ...	6' 9'' to 393' 1''	3' 8'' to 233' 10''
18.	COAL BED. Dip 34° N., ...	6' 11'' to 400' 0''	4' 0'' to 237' 10''
19.	Slate, ...	4' 11'' to 404' 11''	2' 9'' to 240' 7''
20.	Sandstone, . . .	45' 5'' to 450' 4''	24' 9'' to 265' 4''
21.	Slate, ...	12' 9'' to 463' 1''	7' 0'' to 272' 4''
22.	COAL and dirt, .	1'' to 463' 2''	1'' to 272' 5''
23.	Slate, ...	11' 4'' to 474' 6''	6' 0'' to 278' 5''
24.	COAL, slate and bone, ...	6'' to 475' 0''	4'' to 278' 9''
25.	Sandstone, ...	46' 8'' to 521' 8''	24' 0'' to 302' 9''
26.	No VI BED. Dip 30° N., ...	9' 2'' to 530' 10''	4' 6'' to 307' 3''
27.	Slate, ...	4' 6'' to 535' 4''	2' 3'' to 309' 6''
28.	Slaty sandstone, .	5' 9'' to 540' 1''	3' 0'' to 312' 6''
29.	Slate, ...	8' 3'' to 549' 4''	4' 3'' to 316' 9''
30.	Hard SS. and fine cong. Dip 32° N.,	130' 0'' to 679' 4''	68' 9'' to 385' 6''

See Columnar Section Sheet No. II and Mine Sheet No. X, Atlas Western Middle Antracite Field, Part II.

Henry Clay colliery, tunnels from No. X bed to No. VIII bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip*
1.	No. X BED, ...	7' 0'' to 7' 0''	5' 0'' to 5' 0''
2.	Black slate. Dip 46°,	3' 0'' to 10' 0''	2' 2'' to 7' 2''
3.	Hard sandstone, . .	26' 8' to 36' 8''	19' 2'' to 26' 4''
4.	Small conglomerate,	46' 4'' to 83' 0''	33' 3'' to 59' 7''
5.	Hard slate, ...	3' 0'' to 86' 0''	2' 2'' to 61' 9''
6.	COAL BED. Dip 47°,	8' 9'' to 94' 9'	6' 2'' to 67' 11'

No. of strata.	*Description.*	*Thicknesses mesured horizontally.*	*Thicknesses perpendicular to dip.*
7.	Hard fine sandstone,	18′ 1″ to 112′ 10″	13′ 11″ to 81′ 10′
8.	Hard blue slate, . .	31′ 11″ to 144′ 9″	24′ 1″ to 105′ 11″
9.	Hard blue sandstone,	68′ 11″ to 213′ 8″	52′ 9″ to 158′ 8″
10.	Fine dark slate, . .	5′ 8″ to 219 4′	4′ 5″ to 163′ 1″
11.	Sandstone, ...	3′ 8″ to 223′ 0″	2 9″ to 165′ 10″
12.	Soft slate. Dip 54°, .	2′ 2″ to 225′ 2″	1′ 9″ to 167′ 7″
13.	COAL and dirt, . . .	1′ 4″ to 226′ 6″	1′ 0″ to 168′ 7″
14.	Soft slate, ...	3′ 6″ to 230′ 0″	2′ 11″ to 171′ 6″
15.	Fine sandstone, . .	1′ 10″ to 231′ 10″	1′ 7″ to 173′ 1″
16.	COAL, bone and dirt. Dip 60°, ...	4″ to 232′ 2″	4″ to 173′ 5″
17.	Slate, ...	10′ 10″ to 243′ 0″	9′ 7″ to 183′ 0″
18.	Dark sandstone, . .	7′ 8″ to 250′ 8″	6′ 11″ to 189′ 11″
19.	Slate, ...	2″ to 250′ 10″	2″ to 190′ 1″
20.	Hard gray sandstone,	18′ 6″ to 269′ 4″	17′ 2″ to 207′ 3″
21.	COAL and slate. Dip 70°, ...	1″ to 269′ 5″	1″ to 207′ 4″
22.	Hard gray SS. Dip 48°,	38′ 10″ to 308′ 3″	28′ 9″ to 236′ 1″
23.	No. IX BED. Dip 47° N., ...	9′ 0″ to 317′ 3″	6′ 7″ to 242′ 8″
24.	Dark silicious SS., .	19′ 3″ to 336′ 6″	14′ 2″ to 256′ 10″
25.	COAL. Dip 48° N., .	9″ to 337′ 3″	7″ to 257′ 5″
26.	Slaty SS. Dip 47° N.,	7′ 0″ to 344′ 3″	5′ 1″ to 262′ 6″
27.	Hard slate. Dip 47° N., ...	8′ 0″ to 352′ 3″	5′ 10″ to 268′ 4″
28.	Hard SS. Dip 46° N.,	24′ 0″ to 376′ 3″	17′ 3″ to 285′ 7″
29.	Slaty SS. Dip 45° N.,	4′ 4″ to 380′ 7″	3 0″ to 288′ 7″
30.	COAL and slate. Dip 45° N., ...	8″ to 381′ 3″	6′ to 289′ 1″
31.	Slaty SS. Dip 44° N.,	10′ 0″ to 391′ 3″	6′ 11″ to 296′ 0″
32.	Hard silicious sandstone. Dip 43° N.,	13′ 0″ to 404′ 3″	8′ 10″ to 204′ 10″
33.	Sandy slate. Dip 42° N., ...	13′ 0″ to 417′ 3″	8′ 8″ to 313′ 6″
34.	No. VIII BED. Dip 41° N., ...	7′ 0″ to 424′ 3″	4′ 6″ to 318′ 0″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Peerless colliery, tunnel from No. XI bed to No. X bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	**BED NO. XI.**	
2.	Slate,	10′ 0″ to 10′ 0″
3.	Hard sandstone,	23′ 6″ to 33′ 6″
4.	Slaty sandstone,	76′ 9″ to 110′ 3″
5.	COAL BED,	4′ 3″ to 114′ 6″
6.	Slate,	4′ 3″ to 118′ 9″
7.	Hard gray sandstone,	3′ 3″ to 122′ 0″
8.	COAL,	2′ 0″ to 124′ 0″
9.	Slate,	2′ 3″ to 126′ 3″
10.	Sandstone,	27′ 8″ to 154′ 0″
11.	COAL,	1″ to 154′ 1″
12.	Conglomerate,	18′ 6′ to 172′ 6″
13.	**BED NO. X,**	6′ 6″ to 179′ 0″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Garfield colliery, tunnels from No. XI bed to leader.

Garfield Coal Company.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	No. XI (?) BED. Dip 54° N.,	8′ 8″ to 8′ 8″	7′ 0″ to 7′ 0″
2.	SS. and hard black slate with iron balls,	62′ 0″ to 70′ 8″	49′ 6″ to 56′ 6″
3.	Sandstone,	45′ 0′ to 115′ 8″	35′ 6′ to 92′ 0″
4.	Hard slate with iron ore balls,	24′ 0″ to 139′ 8″	18′ 8″ to 110′ 8′
5.	COAL BED. Dip 52° N.,	9′ 3″ to 148′ 11″	7′ 4″ to 118′ 0″
6.	Dirt and slate,	1′ 7″ to 150′ 6″	1′ 3″ to 119′ 3″
7.	Fire clay,	11″ to 151′ 5″	9″ to 120′ 0″
8.	Hard dark sandstone,	42′ 11′ to 194′ 4″	33′ 6″ to 153′ 6″
9.	Hard slate,	8′ 10″ to 203′ 2″	7′ 0″ to 160′ 6″
10.	Slate and bone,	1′ 4″ to 204′ 6″	1′ 1″ to 161′ 7″
11.	COAL and bone,	1′ 11″ to 206′ 5″	1′ 6″ to 163′ 1″
12.	Slate,	2′ 6″ to 208′ 11″	2′ 1″ to 165′ 2″
13.	Hard slaty sandstone,	11′ 6″ to 220′ 5″	9′ 5″ to 174′ 7″
14.	Very hard sandstone,	27′ 6″ to 247′ 11″	22′ 9″ to 197′ 4″
15.	COAL,	11″ to 248′ 10″	8″ to 198′ 0″
16.	Slate,	5′ 11″ to 254′ 9″	4′ 9″ to 202′ 9″
17.	COAL. Dip 59° N.,	1′ 2″ to 255′ 11″	10″ to 203′ 7″
18.	Slate,	3′ 7″ to 259′ 6″	3′ 1″ to 206′ 8″
19.	Dirt,	8″ to 260′ 2″	7″ to 207′ 3″

See Columnar Section Sheet No. II and Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Enterprise colliery, Water Level tunnel, from surface to No. VIII bed.

Baumgardner & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**Wash (timbered),**	100′ 0″ to 100′ 0″	17′ 4″ to 17′ 4″
2.	**Hard silicious SS.,**	32′ 0″ to 132′ 0″	5′ 6″ to 22′ 10″
3.	**Fire clay (argillaceous slate.) Dip at 140′, N. 10°,**	16′ 0″ to 148′ 0″	3′ 8″ to 26′ 6″
4.	**Coal bed,**	14′ 0″ to 162′ 0″	5′ 5″ to 31′ 11″
5.	**Fire clay,**	3′ 7″ to 165′ 7″	2′ 1″ to 34′ 0″
6.	**Fine grained SS.,**	8′ 5″ to 174′ 0″	1′ 10″ to 35′ 10″
7.	**Sandstone and slate 250′. Dip 18° N.,**	59′ 0″ to 233′ 0″	20′ 3″ to 56′ 1″
8.	**Hard silicious SS.,**	57′ 0″ to 290′ 0″	19′ 6″ to 75′ 7″
9.	**Hard black slate,**	10′ 0″ to 300′ 0″	6 5″ to 82′ 0″
10.	**Bony coal,**	9″ to 300′ 9″	6″ to 82′ 6″
11.	**Sandstone,**	23′ 11″ to 324′ 8″	15′ 8″ to 98′ 2″
12.	**Very hard slate,**	8′ 4″ to 333′ 0″	5′ 6″ to 103′ 8″
13.	**Coal bed,**	VIII and IX,	3′ 8″ to 107′ 4″
14.	**Slate,**		2′ 4″ to 109′ 8″
15.	**Coal bed,**		6′ 8″ to 116′ 4″
16.	**Slate,**		2′ 4″ to 118′ 8″
17.	**Coal bed,**		7′ 1″ to 125′ 9″

See Columnar Section Sheet No. II, Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Enterprise colliery. Tunnel (bottom lift of slope No. 2) from No. VIII bed to Buck Mountain bed.

Baumgardner & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**No. VIII bed. Dip 35° N.,**	13′ 1″ to 13′ 1″	7′ 6″ to 7′ 6″
2.	**Hard slate,**	8′ 0″ to 21′ 1″	4′ 8″ to 12′ 2″
3.	**Hard SS. and fine cong.,**	62′ 4″ to 83′ 5″	37′ 6″ to 49′ 8″
4.	**Slate, hard,**	1′ 0″ to 84′ 5″	7″ to 50′ 3″
5.	**Coal, slate and bone,**	2′ 0″ to 86′ 5″	1′ 3″ to 51′ 6″
6.	**Hard SS. and fine cong.,**	38′ 8′ to 125′ 1″	23′ 9″ to 75′ 3″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
7.	SKIDMORE BED No. VII. Dip 39° N., ...	5′ 10″ to 130′ 11″	3′ 8″ to 78′ 11″
8.	Hard SS. Dip 49° N., ...	121′ 2″ to 252′ 1″	88′ 7″ to 167′ 6″
9.	Hard slate, . . .	1′ 3″ to 253′ 4″	10″ to 168′ 4″
10.	COAL and slate. Dip 46° N., . .	1′ 1″ to 254′ 5″	11″ to 169′ 3″
11.	Very hard slate,	8′ 8″ to 263′ 1″	6′ 3″ to 175′ 6″
12.	Very hard SS., .	94′ 6″ to 357 7″	69′ 1″ to 244′ 7″
13.	BUCK MOUNTAIN BED No. V. Dip 48° N., ...	8′ 8″ to 366′ 3″	6′ 5″ to 251′ 0″

See Columnar Section Sheet No. II, Mine Sheet No. VI, Atlas Western Middle Anthracite Field, Part II.

Pennsylvania colliery, tunnel from No. X to No. XI bed, in upper level, 300 feet east of accommodation slope.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses measured perpendicular to dip.*
	No. X BED.		
1.	Hard SS. Dip N. 18°,	29′ 0″ to 29′ 0″	8′ 11″ to 8′ 11″
2.	Slate, ...	2′ 8″ to 31′ 8″	10″ to 9′ 9″
3.	Hard SS. Dip N. 21°,	137′ 4″ to 169′ 0″	46′ 11″ to 56′ 8″
4.	Slate, ...	35′ 0″ to 204′ 0″	12′ 0″ to 68′ 8″
5.	Coal, ...	5′ 0″ to 209′ 0″	1′ 6″ to 70′ 2″
6.	Slate, ...	8′ 0″ to 217′ 0″	3′ 6″ to 73′ 8″
7.	Hard silicious SS., .	67′ 0″ to 284′ 0″	30′ 6″ to 104′ 2″
8.	Hard slate, ...	8′ 0″ to 292′ 0″	4′ 0″ to 108′ 2″
9.	Hard sandstone, . .	56′ 0″ to 348′ 0″	28′ 0″ to 136′ 2″
10.	Hard bastard slate, .	8′ 0″ to 356′ 0″	4′ 0″ to 140′ 2″
11.	Sandstone, ...	22′ 0″ to 378′ 0″	11′ 0″ to 151′ 2″
12.	Slate, ...	5′ 0″ to 383′ 0″	2′ 6″ to 153′ 8″
13.	Bone and coal, . . .	2′ 8″ to 385′ 8″	1′ 6″ to 155′ 2″
14.	Slate, ...	1′ 6″ to 387′ 2″	1′ 4″ to 156′ 6″
15.	Bony coal, ...	1′ 4″ to 388′ 6″	9″ to 157′ 3″
16.	Hard slate. Dip N. 33°,	9′ 6″ to 398′ 0″	6′ 0″ to 163′ 3″
	No. IX BED.		

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Pennsylvania colliery, No. 2 cross-cut 1800 feet west of bottom of slope No. 1.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Slate,	8' 0" to 8' 0"	4' 4" to 4' 4"
2.	Sandstone. N. 66°,	33' 4" to 41' 4"	22' 6" to 26' 10"
3.	Hard SS. and coal, &c. Dip at 63' 6". S. 22°,	62' 8" to 104' 0"	
4.	Coal bed. Dip at 100'. N. 28°,	25' 0" to 129' 0"	4' 6" to 31' 4"
5.	Hard slate,	18' 0" to 147' 0"	9' 6" to 40' 10"
6.	Hard sandstone,	5' 0" to 152' 0"	2' 8" to 43' 6"
7.	Dirt,	2' 3" to 154' 3"	1' 2" to 44' 8"
8.	Hard silicious SS.,	55' 9" to 210' 0"	30' 9" to 75' 5"
9.	No. VIII coal bed,	14' 0" to 224' 0"	8' 2" to 83' 7"

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Pennsylvania colliery, tunnel 600 feet east of bottom of slope No. 1.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
	No. VIII coal bed.		8' 2" to 8' 2"
1.	Slate. Dip at 20'. N. 7°,	64' 0" to 64' 0"	11' 1" to 19' 3"
2.	Hard silicious SS. Dip at 160'. N. 16°,	118' 0" to 182' 0"	32' 6" to 51' 9"
3.	Slate. Dip at 250'. N. 24°,	1' 10" to 183' 10"	6" to 52 3"
4.	Hard silicious SS.,	167' 2" to 351' 0"	57' 2" to 109' 5"
5.	Slate. Dip at 350'. N. 41°,	8" to 351' 8"	4" to 109' 9"
6.	Hard silicious SS.,	69' 4" to 421' 0"	36' 9" to 146' 6"
7.	COAL bed. Dip at 24° N.,	8' 0" to 429' 0"	4' 3" to 150 9"
8.	Hard slate,	3' 3" to 432' 3"	1' 9" to 152' 6"
9.	Hard silicious SS. Dip 740'. N. 24°,	340' 9" to 773' 0"	138' 7" to 291' 1"

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

APR

Bellmore colliery, Coal Ridge Diamond Drill bore-hole No. 5.

S. S. Bickel & Co.

No. of strata.	*Description.*		*Thicknesses measured perpendicular to dip.*
1.	Wash,		23′ 0″ to 23′ 0″
2.	Sandstone,		1′ 0″ to 24′ 0″
3.	Slate,		8″ to 24′ 8″
4.	COAL,		4″ to 25′ 0″
5.	Slate,		6′ 0″ to 31′ 0″
6.	COAL,		1′ 6″ to 32′ 6″
7.	Slate,		1′ 5″ to 33′ 11″
8.	ORCHARD BED,		4′ 1″ to 38′ 0″
9.	Slate and sandstone,		122′ 6″ to 160′ 6″
10.	COAL,	PRIMROSE BED.	5′ 11″ to 166′ 5″
11.	Slate,		1′ 0″ to 167′ 5″
12.	COAL,		10″ to 168′ 3″
13.	Sandstone and slate,		30′ 10″ to 199′ 1″
14.	COAL,		2″ to 199′ 3″
15.	Sandstone,		13′ 0″ to 212′ 3″
16.	Conglomerate,		81′ 0″ to 293′ 3″
17.	Slate,		2′ 0″ to 295′ 3″
18.	Sandstone,		20 1″ to 315′ 4″
19.	Conglomerate,		6′ 6″ to 321′ 10″
20.	Slate,		1′ 0′ to 322′ 10″
21.	HOLMES BED,		9′ 0″ to 331′ 10″
22.	Slate,		6′ 6″ to 338′ 4″
23.	COAL,		1′ 4″ to 339′ 8″
24.	Slate,		9′ 1″ to 348′ 9″
25.	COAL,		2′ 5″ to 351′ 2″
26.	Slate,		27′ 7″ to 378′ 9″
27.	COAL,	MAMMOTH BED, (top split.)	3′ 4″ to 382′ 1″
28.	Slate,		4″ to 382′ 5″
29.	COAL,		4′ 4″ to 386′ 9″
30.	Slate,		6″ to 387′ 3″
31.	COAL,		15′ 0″ to 402′ 3″
32.	Slate,		45′ 0″ to 447′ 3″
33.	Fine blue rock,		60′ 0″ to 507 3″
34.	MAMMOTH BED, top split,		14′ 5″ to 521′ 8″
35.	Slate,		1′ 6″ to 523′ 2″
36.	Bony coal,		1′ 4″ to 524′ 6″
37.	Slate,		1′ 3″ to 525′ 9″
38.	Blue rock,		9″ to 526′ 6″
39.	Sandstone,		5′ 6″ to 532′ 0′
40.	SKIDMORE BED,		1′ 2″ to 533′ 2′
41.	Slate,		9′ 7″ to 542′ 9″
42.	Blue rock,		11′ 9″ to 554′ 6″
43.	Slate,		5′ 9″ to 560′ 3″
44.	Fine gray rock,		46′ 11″ to 607′ 2′

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
45.	Slate,	1' 0'' to 608' 2''
46.	Fine gray rock and streaks of coal,	35' 5'' to 643' 7''
47.	Fine conglomerate,	5' 9'' to 649' 4''
48.	Slate,	9'' to 650' 1''
49.	BUCK MOUNTAIN BED,	3' 5'' to 653' 6''
50.	Slate,	5' 4'' to 658' 10''
51.	Blue rock,	66' 8'' to 725' 6''
52.	Conglomerate,	20' 6'' to 746' 0''
53.	Blue rock,	15' 6'' to 761' 6''
54.	Coarse conglomerate,	49' 6'' to 811' 0''
55.	Fine blue rock,	2' 0'' to 813' 0''

See Columnar Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Bellmore colliery, Diamondtown tunnel, from surface through Mammoth bed.

S. S. Bickel & Co.

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
1.	Slate,	18' 0' to 18' 0''
2.	COAL BED,	6' 0 ' to 24' 0''
3.	Interval,	30' 0'' to 54' 0''
4.	COAL,	6'' to 54' 6''
5.	Sandstone,	75' 0'' to 129' 6''
6.	Shelly COAL,	1' 0 ' to 130' 6''
7.	Slate,	8' 0'' to 138' 6''
8.	Sandstone,	65' 0'' to 203' 6''
9.	COAL,	1' 0'' to 204' 6''
10.	Slate,	7· 0'' to 211' 6''
11.	COAL,	1' 6'' to 213' 0''
12.	Sandstone,	85' 0'' to 298' 0''
13.	COAL,	8 ' to 298' 8''
14.	Interval,	18' 0'' to 316' 8''
15.	MAMMOTH BED (upper member),	14' 0'' to 330' 8''
16.	Slate,	10' 0'' to 340' 8''
17.	Sandstone,	30' 0'' to 370' 8''
18.	Black slate,	18' 0'' to 388' 8''
19.	MAMMOTH BED (lower member),	3' 6'' to 392' 2''
20.	Slate,	15' 0'' to 407' 2''
21.	COAL,	6'' to 407' 8''
22.	Interval,	4' 0'' to 411' 8''
23.	COAL,	2' 0'' to 413' 8''
24.	Sandstone,	15' 0'' to 428' 8''
25.	COAL,	6'' to 429' 2''
26.	Sandstone,	25' 0'' to 454' 2''
27.	COAL,	6'' to 454' 8''
28.	Sandstone,	40' 0 ' to 494' 8''

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Mt. Carmel colliery, Stuartville Diamond Drill bore-hole.

Thomas M. Righter & Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*		
1.	Shaft,	23' 6''	to	23' 6''
2.	MAMMOTH BED,	34' 4''	to	57' 10''
3.	Sand, slate and stone,	21' 7''	to	79' 5''
4.	Gray rock,	15' 2''	to	94' 7''
5.	Fine conglomerate,	2' 0''	to	96 7''
6.	Spar,	3''	to	96' 10''
7.	Sandslate and stone,	8' 2''	to	105' 0''
8.	Slate,	1''	to	105' 1''
9.	COAL BED,	16' 3''	to	121' 4''
10.	Slate,	2''	to	121' 6''
11.	Sandstone and sandslate,	11' 4''	to	132' 10''
12.	Slate,	1' 5''	to	134' 3''
13.	COAL,	1' 11''	to	136' 2''
14.	Slate,	1' 9''	to	137' 11''
15.	Sandstone,	3' 2''	to	141' 1''
16.	Fine gray rock,	4' 0''	to	145' 1''
17.	Quartz and faulty measures,	2' 5''	to	147' 6''
18.	Fine gray rock,	4' 2''	to	151' 8''
19.	Slate,	1' 6''	to	153' 2''
20.	COAL,	2' 1''	to	155' 3''
21.	Slate,	6''	to	155' 9''
22.	Sandstone,	16' 11''	to	172' 8''
23.	Gray rock,	2' 2''	to	174' 10''
24.	Fine conglomerate,	24' 0''	to	198' 10''
25.	Sandslate,	6''	to	199' 4''
26.	Conglomerate, fine and coarse,	14' 3''	to	213' 7''
27.	Sandstone and sandslate,	6' 0'	to	219' 7''
28.	Conglomerate,	49' 10''	to	269' 5''
29.	COAL,	1' 0''	to	270' 5''
30.	Slate,	8''	to	271' 1''
31.	COAL,	3''	to	271' 4''
32.	Sandstone,	6' 1''	to	277' 5''
33.	Slate,	8' 5''	to	285' 10''
34.	Sandslate,	3' 10''	to	289' 8''
35.	Conglomerate,	19' 4''	to	309' 0''
36.	COAL,	6''	to	309' 6''
37.	Slate,	1' 9''	to	311' 3''
38.	Sandslate,	2' 2''	to	313' 5''
39.	Conglomerate,	16' 3''	to	329' 8''
40.	Slate (2'' shelly coal),	4' 6''	to	334' 2''
41.	Slate and sandslate,	9' 1''	to	343' 3''
42.	Conglomerate, fine and coarse,	20' 3''	to	363' 6''
43.	Slate,	1' 3''	to	364' 9''
44.	Conglomerate, fine and coarse,	62' 6''	to	427' 3''
45.	Slate,	10''	to	428' 1''

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
46.	Coarse conglomerate (2″ bony),	10′ 7″ to 438′ 8″
47.	Sandstone and sandslate mixed,	12′ 6″ to 451′ 2″
48.	Conglomerate, coarse and fine,	37′ 5′ to 488′ 7″
49.	Slate,	1′ 2″ to 489′ 9″
50.	Slate, shelly,	10″ to 490′ 7″
51.	COAL,	8″ to 491′ 3″
52.	Slate,	1′ 8″ to 492′ 11″
53.	Coarse conglomerate,	40′ 0″ to 532′ 11″
54.	Sandslate,	2′ 6″ to 535′ 5″
55.	Coarse conglomerate,	8′ 8″ to 544′ 1″
56.	Gray blue conglomerate with quartz seams,	3′ 9″ to 547′ 10″
57.	Slate, shelly,	3″ to 548′ 1″
58.	Conglomerate,	14′ 10″ to 562′ 11″
59.	Slate shelly with coal seams,	1′ 9″ to 564′ 8″
60.	Slate,	4′ 2″ to 568′ 10″
61.	Conglomerate,	9′ 8″ to 578′ 6″
62.	Slate, shelly,	8″ to 579′ 2″
63.	Conglomerate, coarse and egg,	86′ 8″ to 665′ 10″
64.	Slate,	8′ 5″ to 674′ 3″
65.	Sandslate,	1′ 6″ to 675′ 9″
66.	Conglomerate,	11′ 6″ to 687′ 3″
67.	Sandslate,	5′ 7″ to 692′ 10″
68.	Fine conglomerate,	9″ to 693′ 7″
69.	Sandslate,	5′ 7″ to 699′ 2′
70.	Conglomerate,	77′ 2″ to 776′ 4″
71.	Fine conglomerate. (Dip 5°).	2′ 0″ to 778′ 4″
72.	Conglomerate,	16′ 5″ to 794′ 9″
73.	Fine conglomerate, seamy,	3′ 6″ to 798′ 3″
74.	Coarse conglomerate,	38′ 7″ to 836′ 10″
75.	Sandslate,	4″ to 837′ 2″
76.	Conglomerate,	19′ 7″ to 856′ 9″
77.	Sandslate,	4″ to 857′ 1″
78.	Conglomerate,	25′ 3″ to 882′ 4″
79.	Slate and sandstone,	3′ 2″ to 885′ 6″
80.	Conglomerate, coarse,	60′ 0″ to 945′ 6″
81.	COAL,	1′ 1″ to 946′ 7″
82.	Bone,	4″ to 946′ 11″
83.	Slate,	11″ to 947′ 10″
84.	Coarse conglomerate,	31′ 7″ to 979 5″
85.	COAL. (Dip 3°).	4′ 9″ to 984′ 2″
86.	Slate,	4′ 1″ to 988′ 3″
87.	Sandstone,	4′ 10″ to 993′ 1″
88.	Conglomerate,	6′ 11″ to 1000 0″

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Mt. Carmel colliery, Stuartville bore-hole No. 37.

Thomas M. Righter & Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Wash,	16' 0'' to 16' 0''
2.	Sandstone,	32' 3'' to 48' 3''
3.	Conglomerate,	13' 11'' to 62' 2''
4.	Slate,	10' 5'' to 72' 7''
5.	Sandstone,	9'' to 73' 4''
6.	Slate,	10'' to 74' 2''
7.	Sandstone,	16' 11'' to 91' 1''
8.	Slate,	32' 11'' to 124' 0''
9.	MAMMOTH BED (top member) No. IX.	

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Reliance colliery tunnel on 1st lift of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED,	18' 0'' to 18' 0''
2.	Slate,	4' 0'' to 22' 0''
3.	Sandstone,	48' 0'' to 70' 0''
4.	Slate,	6' 0'' to 76' 0''
5.	COAL,	9'' to 76' 9''
6.	Slate,	3' 0'' to 79' 9''
7.	Hard gray sandstone,	6' 0'' to 85' 9''
8.	Hard dark sandstone,	25' 0'' to 110' 9''

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Alaska shaft from surface to No. VIII coal bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Wash,	7' 0'' to 7 0''	7' 0' to 7' 0''
2.	Sandstone,	16' 0'' to 23' 0''	16' 0'' to 23' 0''
3.	Dark slate,	12' 6'' to 35' 6''	12' 6'' to 35' 6''
4.	COAL,	2' 8'' to 38' 2''	2' 6'' to 38' 0''
5.	Slate,	1' 0'' to 39 2''	1' 0'' to 39' 0''
6.	COAL,	1' 6'' to 40' 8''	1' 5'' to 40' 5''
7.	Blue slate,	21' 7'' to 62' 3''	20' 8'' to 61' 1''

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
8.	Gray rock,	44' 4'' to 106' 7''	42' 0'' to 103' 1''
9.	Coal, rough,	1' 6'' to 108' 1''	1' 5'' to 104' 6''
10.	Slate,	10'' to 108 11''	9'' to 105' 3''
11.	Coal,	1' 8'' to 110' 7''	1' 7'' to 106' 10''
12.	Hard slate,	8' 0'' to 118' 7''	7' 8'' to 114' 6''
13.	Blue slate,	29' 0'' to 147' 7''	28' 0'' to 142' 6'
14.	Slate,	3' 0'' to 150' 7''	2' 11'' to 145' 5''
15.	Coal and bone,	3' 6'' to 154' 1''	3' 5'' to 148' 10''
16.	Gray rock,	106' 2'' to 260' 3''	103' 8'' to 252' 6''
17.	Coal, No. VIII,	20' 0'' to 280' 3''	19' 8'' to 272' 2''

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Merriam colliery, tunnel from Mammoth to Skidmore bed, West counter gangway.

P. & R. C. & I. Co,

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Mammoth bed,	24' 6'' to 24' 6''
2.	Slate,	2' 0'' to 26' 6''
3.	Sandstone,	21' 0'' to 47' 6''
4.	Slaty sandstone,	3' 0'' to 50' 6''
5.	Slaty sandstone,	18' 0'' to 68' 6''
6.	Coal,	2' 3'' to 70' 9''
7.	Slaty sandstone,	9' 0'' to 79' 9''
8.	Hard gray sandstone,	19' 0'' to 98' 9''
9.	Slate,	5' 0'' to 103' 9''
10.	Hard gray sandstone,	50' 0'' to 153' 9''
11.	Skidmore bed (?),	7' 6'' to 161' 3''

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Merriam colliery, tunnel to Buck Mountain (?) bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Sandstone,	10' 0'' to 10' 0''
2.	Coal,	5' 0'' to 15' 0''
3.	Slate,	12' 0' to 27' 0''
4.	Sandstone,	16' 0'' to 43' 0''
5.	Coal,	6' 0'' to 49' 0''

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
6.	Slate,	28' 0'' to 77' 0''
7.	COAL,	6' 5'' to 83' 5''
8.	Slate,	10' 0'' to 93' 5''
9.	MAMMOTH BED, bottom member,	23' 0'' to 116' 5''
10.	Strata,	78' 0'' to 194' 5''
11.	SKIDMORE BED,	7' 0'' to 201' 5''
12.	Strata,	56' 0'' to 257' 5''
13.	SEVEN-FOOT BED,	5' 0'' to 262' 5''
14.	Strata,	94' 0'' to 356' 5''
15.	BUCK MOUNTAIN BED,	15' 0'' to 371' 5'

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Gordon colliery, Water Level tunnel.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thickness perpendicular to dip.*
1.	Hard silicious SS.,	8' 6'' to 8' 6''	8' 6'' to 8' 6''
2.	Hickory nut cong.,	15' 6'' to 24' 0''	15' 6'' to 24' 0''
3.	Black silicious SS.,	14' 0'' to 38' 0''	14' 0'' to 38 0''
4.	COAL,	5' 0'' to 43' 0''	5' 0'' to 43' 0''
5.	Hard silicious SS.,	29' 0'' to 72' 0''	29' 0'' to 72' 0''
6.	Hickory nut cong.,	7' 0'' to 79' 0''	7' 0'' to 79' 0''
7.	Silicious sandstone,	6' 6'' to 85' 6''	6' 6'' to 85' 6''
8.	COAL,	6'' to 86' 0''	6'' to 86' 0''
9.	Dark hard slate,	11' 0'' to 97' 0''	11' 0'' to 97' 0''
10.	Dark siliciaus SS. with quartz rock,	26' 0'' to 123' 0''	26' 0'' to 123' 0'
11.	SS. running into hickory nut cong.,	7' 0'' to 130' 0''	7' 0'' to 130' 0''
12.	Mustard cong. gradually running into silicious SS.,	29' 0'' to 159' 0''	29' 0'' to 159' 0''
13.	Silicious sandstone,	12' 0'' to 171' 0''	12 0'' to 171' 0'
14.	Conglomerate,	6' 6'' to 177' 6''	6' 6'' to 177' 6''
15.	Slate,	1' 0'' to 178' 6''	1' 0'' to 178' 6''
16.	Dark silicious SS.,	32' 6'' to 211' 0''	32' 6'' to 211' 0''
17.	Pea conglomerate,	34' 0'' to 245' 0''	34' 0'' to 245' 0''
18.	Hard silicious SS,	5' 0'' to 250' 0''	5' 0'' to 250' 0''
19.	Conglomerate and SS,	10' 0'' to 260' 0''	10' 0'' to 260' 0''
20.	Clay,	1' 0'' to 261' 0''	1' 0'' to 261' 0''
21.	Dark sandy slate,	11' 0'' to 272' 0''	11' 0'' to 272 0''
22.	Hickory nut cong.,	9' 0'' to 281' 0''	9' 0'' to 281' 0''
23.	Dark silicious SS.,	58' 0'' to 339' 0''	58' 0'' to 339' 0''

See Columnar Section Sheet No. II and Mine Sheet No. V, Atlas Western Middle Anthracite Field, Part II.

Bellmore colliery (Bell's tunnel) from surface to Lykens Valley bed.

S. S. Bickel & Co.

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Wash, ...		200′ 0″ to 200′ 0″	200′ 0″ to 200′ 0″
2.	Slate, ...		24′ 0′ to 224′ 0″	18′ 5′ to 218′ 5″
3.	Coal. Dip S. 50°, ...		1′ 0″ to 225′ 0″	1′ 0″ to 219′ 5″
4.	Slate and SS., .		49′ 0″ to 274 0″	38′ 10″ to 258′ 3″
5.	Coal, ...		3′ 0″ to 277′ 0″	3′ 0″ to 261′ 3″
6.	Sandstone, . .		34′ 0″ to 311′ 0″	28′ 8″ to 289′ 11″
7.	Primrose bed. Dip S. 60°, .		15′ 0″ to 326′ 0″	13′ 0″ to 302′ 11″
8.	Slate, ...		8′ 0″ to 334′ 0″	6′ 11″ to 309′ 10″
9.	Holmes bed,		1′ 6″ to 335′ 6″	1′ 6″ to 311′ 4″
10.	Slate, ...		18′ 0″ to 353′ 6″	15′ 7″ to 326′ 11″
11.	Sandstone, . .		4′ 0″ to 357′ 6″	3′ 6″ to 330′ 5″
12.	Slate with coal dirt, .		8′ 0″ to 365′ 6″	6′ 11″ to 337′ 4″
13.	Sandstone, . .		11′ 0″ to 376′ 6″	9′ 6″ to 346′ 10″
14.	Slate, ...		12′ 0″ to 388′ 6″	10′ 5″ to 357′ 3″
15.	Sandstone, . .		41′ 0″ to 429′ 6″	35′ 6″ to 392′ 9″
16.	Slate, ...		1′ 0″ to 430′ 6″	10″ to 393′ 7″
17.	Sandstone, . .		30′ 0″ to 460′ 6″	26′ 0″ to 419′ 7″
18.	Slate, ...		9′ 0″ to 469′ 6″	7′ 10″ to 427′ 5″
19.	Sandstone, . .		21′ 0″ to 490′ 6″	18′ 2″ to 445′ 7″
20.	Slate, ...		2′ 0″ to 492′ 6″	1′ 2″ to 446′ 9″
21.	Sandstone, . .		15′ 6″ to 508′ 0″	13′ 5″ to 460′ 2″
22.	Clod, ...		6″ to 508′ 6″	5″ to 460′ 7″
23.	Sandstone, . .		23′ 0″ to 531′ 6″	19′ 11″ to 480′ 6″
24.	Slate, ...		13′ 0″ to 544′ 6″	11′ 3″ to 491′ 9″
25.	Sandstone, . .		77′ 6″ to 622′ 0″	67′ 1″ to 558′ 10″
26.	Slate, ...		6″ to 622′ 6″	5″ to 559′ 3″
27.	Sandstone, . .		11′ 0″ to 633′ 6″	9′ 6″ to 568′ 9″
28.	Slate, ...		10′ 0″ to 643′ 6″	8′ 8″ to 577′ 5″
29.	Coal. Dip S. 60°,	Mammoth Bed. (top split.)	13′ 0″ to 656 6′	11′ 3″ to 588′ 8″
30.	Slate, . .		9′ 0″ to 665′ 6″	7′ 9″ to 596′ 5′
31.	Coal. Dip S. 62°,		4′ 0″ to 669′ 6″	3′ 6″ to 599′ 11″
32.	Slate, ...		10 0″ to 679′ 6″	8′ 10″ to 608′ 9″
33.	Slate, soft, . .		5′ 0″ to 684′ 6″	4′ 5″ to 613′ 2″
34.	SS. slaty, . . .		5′ 0″ to 689′ 6″	4′ 5″ to 617′ 7″
35.	Slate, ...		2′ 0″ to 691′ 6″	1′ 9″ to 619′ 4″
36.	Sandstone, . .		5′ 0″ to 696′ 6″	4′ 5″ to 623′ 9″
37.	Slate, ...		3 0″ to 699′ 6″	2′ 8″ to 626′ 5″
38.	Sandstone, . .		1′ 0″ to 700′ 6″	11″ to 627′ 4″
39.	Slate, ...		1 0″ to 701′ 6″	11″ to 628′ 3′

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
40.	SS. hard, . . .	6' 6'' to 708' 0''	5' 9'' to 634' 0''
41.	Sandstone, soft,	4' 6'' to 712' 6''	4' 0'' to 638' 0''
42.	Sandstone, . .	17' 0 ' to 729' 6''	14' 10'' to 652' 10''
43.	Slate, ...	7' 0'' to 736' 6''	6' 2'' to 659' 0''
44.	MAMMOTH BED bottom split,	12' 0 ' to 748' 6''	10' 6'' to 669' 6''
45.	Slate, ...	14' 0'' to 762' 6''	12' 3' to 681 9''
46.	COAL, ...	7'' to 763' 1''	7'' to 682' 4''
47.	Slate, ...	15' 6'' to 778' 7''	13' 7'' to 695 11''
48.	COAL, ...	6'' to 779' 1''	6'' to 696' 5''
49.	Slate, ...	6'' to 779' 7''	6'' to 696' 11''
50.	Sandstone, . .	10' 0'' to 789' 7''	8' 9'' to 705' 8''
51.	Slate, ...	1 2'' to 790' 9''	1' 0'' to 706' 8''
52.	COAL, ...	10'' to 791' 7''	10'' to 707' 6''
53.	Slate, sandy, .	9' 0'' to 800' 7''	7' 11'' to 715' 5''
54.	Sandstone, . .	24' 0'' to 824' 7''	20' 9'' to 736' 2''
55.	Slate, sandy, .	4' 0'' to 828' 7''	3' 6'' to 739' 8''
56.	SS. slaty, . . .	6' 0'' to 834' 7''	5' 2'' to 744' 10''
57.	Sandstone, . .	30' 0'' to 864' 7''	26' 0'' to 770' 10''
58.	COAL, ...	2'' to 864' 9''	2'' to 771' 0''
59.	Sandstone, . .	21' 0'' to 885' 9''	18' 2'' to 789' 2''
60.	Slate, ...	3' 0'' to 888' 9''	2' 7'' to 791' 9''
61.	Sandstone, . .	9' 0'' to 897' 9''	7' 10'' to 799' 7''
62.	Sandstone, . .	3' 5'' to 901' 2 '	3' 0'' to 802' 7''
63.	COAL, ...	7'' to 901' 9''	7'' to 803' 2''
64.	SS. slaty, . . .	14' 0'' to 915' 9''	12' 2'' to 815' 4''
65.	Sandstone, . .	40' 0'' to 955' 9''	34' 8'' to 850' 0''
66.	BUCK MOUNTAIN, . . .	4' 0'' to 959' 9''	3' 6'' to 853' 6''
67.	Slate, ...	4' 2'' to 963' 11''	3' 6'' to 857 0''
68.	Dark SS., . .	44' 2'' to 1008' 1''	36' 7'' to 893' 7''
69.	Hard slate with few iron pyrites, ...	10' 1'' to 1018' 2''	7' 2'' to 900' 9''
70.	Dark hard silicious SS., . .	15' 9'' to 1033' 11''	11' 2'' to 911' 11''
71.	Slate, ...	7' 0'' to 1040' 11''	4' 11'' to 916' 10''
72.	Dark hard silicious SS., . .	15' 1'' to 1056' 0''	10' 8'' to 927' 6''
73.	Cong. with hickory, walnut and mustard seed pebbles, ...	12' 9'' to 1068' 9''	9' 0'' to 936' 6''
74.	Dark SS. with benches of softer SS. and cong. at intervals, ...	13' 4'' to 1082' 1''	9' 4'' to 945' 10'

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
75.	Hickory-nut cong., . . .	2′ 1″ to 1084′ 2″	1′ 6″ to 947 4″
76.	Dark hard SS.,	3′ 11″ to 1088′ 1″	2′ 9″ to 950′ 1″
77.	Cong. hickory-nut and pea,	2′ 8″ to 1090′ 9″	1′ 10″ to 951′ 11″
78.	Dark hard SS.,	2′ 3″ to 1093′ 0″	1′ 7″ to 953′ 6″
79.	Slate, ...	3′ 1″ to 1096′ 1″	2′ 2″ to 955′ 8″
80.	Dark SS., . .	2′ 6″ to 1098′ 7″	1′ 9″ to 957′ 5″
81.	Cong. very hard and silicious hickory nut, ...	31′ 9″ to 1130′ 4″	22′ 5″ to 979′ 10″
82.	Dark hard very silicious SS.,	10′ 5″ to 1140′ 9″	7′ 4″ to 987′ 2″
83.	Hickory-nut cong., . . .	7′ 6″ to 1148′ 3″	5′ 4″ to 993′ 6″
84.	Dark hard very silicious SS.,	2′ 3″ to 1150′ 6″	1′ 7″ to 994′ 1″
85.	Cong. compact,	2′ 7″ to 1153′ 1″	1′ 10″ to 995′ 11″
86.	Soft slate, . .	2′ 3″ to 1155′ 4″	1′ 7″ to 997′ 6″
87.	COAL, dirty and shelly, .	3′ 1″ to 1158′ 5″	2′ 2″ to 999′ 8″
88.	Hard sandy slate, ...	18′ 4″ to 1176′ 9″	13′ 7″ to 1013′ 3″
89.	Hard dark silicious SS., .	5′ 0″ to 1181′ 9″	3′ 9″ to 1017′ 0″
90.	Hickory-nut cong., . . .	5′ 0″ to 1186′ 9″	3′ 9″ to 1020′ 9″
91.	Dark hard silicious SS., . .	35′ 0″ to 1221′ 9″	26′ 0″ to 1046′ 9″
92.	Hickory-nut cong. running into compact silicious rock,	9′ 0″ to 1230′ 9″	6′ 8″ to 1053′ 5″
93.	Dark hard silicious SS., . .	14′ 0″ to 1244′ 9″	10′ 5″ to 1063′ 10″
94.	Hickory-nut cong., . . .	11′ 0″ to 1255′ 9″	8′ 2″ to 1072′ 0″
95.	Dark hard silicious SS., . .	4′ 0″ to 1259′ 9″	3′ 0″ to 1075′ 0″
96.	Hickory-nut cong., . . .	3′ 0″ to 1262′ 9″	2′ 3″ to 1077′ 3″
97.	Dark SS., . . .	2′ 10″ to 1265′ 7″	2′ 0″ to 1079′ 3″
98.	Hickory-nut cong., . . .	3′ 0″ to 1268′ 7″	2′ 3″ to 1081′ 6″
99.	Sandstone, . .	1′ 2″ to 1269′ 9″	10″ to 1082′ 4″
100.	LYKENS VALLEY BED, . .	3′ 8″ to 1273′ 5″	3′ 2″ to 1085′ 6″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Bellmore colliery, tunnel on slope level, east gangway, from centre of basin to Mammoth bed (top split).

S. S. Bickel & Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Slate,	5' 10'' to 5' 10''
2.	Sandstone,	6' 10'' to 12' 8''
3.	COAL BED,	4' 6'' to 17' 2''
4.	Slate,	4' 10'' to 22' 0''
5.	Sandstone, hard,	4' 4'' to 26' 4''
6.	Slate,	11' 4'' to 37' 8''
7.	Sandstone, hard,	6' 6'' to 44' 2''
8.	COAL BED,	5' 4'' to 49' 6''
9.	Sandy slate,	8' 0'' to 57' 6''
10.	Sandstone, hard,	84' 10'' to 142' 4''
11.	Dirt,	1'' to 142' 5
12.	Sandstone, hard,	78 8'' to 221' 1
13.	Slate and iron ore balls,	1' 4'' to 222' 5''
14.	Iron ore and black band,	1' 10'' to 224' 3''
15.	Slate and iron ore balls,	8' 1'' to 232' 4''
16.	COAL BED, (soft,)	3' 10'' to 236' 2''
17.	Slate,	5' 5 ' to 241' 7'
18.	Sandstone, hard,	47' 7'' to 289' 2''
19.	COAL,	1' 10'' to 291' 0''
20.	Sandstone, hard,	29' 1'' to 320' 1''
21.	Slate,	7' 2'' to 327' 3''
22.	MAMMOTH BED (top split),	9' 0'' to 336' 3''

See Columnar Section Sheet No. III and Mine Sheet No. IV, Western Middle Coal Field Atlas, Parts I and II.

Morris Ridge colliery, tunnel on 3d lift of slope.

Isaac May & Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED,	26' 2'' to 26' 2''
2.	Sandy slate,	2' 1'' to 28' 3''
3.	Sandstone, dark, slaty to silicious,	16' 1'' to 44' 4''
4.	Dark slate,	1' 1'' to 45' 5''
5.	Sandstone, dark, hard, silicious,	18' 7'' to 64' 0''
6.	Sandstone, very hard, silicious,	10' 7'' to 74' 7''
7.	Slate,	3' 1'' to 77' 8''
8.	SKIDMORE BED,	3' 1'' to 80' 9''
9.	Slate,	10' 6'' to 91' 3''
10.	Sandy slate,	13' 3'' to 104' 6''
11.	Fire clay,	2' 0'' to 106' 6''
12.	Sandstone, silicious,	2' 0'' to 108' 6''

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
13.	Sandy slate, ...	11' 9" to 120' 3"
14.	Sandstone, light silicious, ...	14' 10' to 135' 1"
15.	Sandstone, dark, hard, silicious, ...	84' 3" to 219' 4"
16.	Slate, ...	6" to 219' 10"
17.	Sandstone, hard, ...	50' 1" to 269' 11"
18.	Slate, hard, ...	6' 4" to 276' 3"
19.	SEVEN-FOOT BED, ...	6' 3" to 282' 6"
20.	Slate, ...	5' 2" to 287' 8"
21.	Sandy slate, ...	6' 0" to 293' 8"
22.	Sandy slate, hard, ...	3' 5" to 297' 1"
23.	COAL and dirt, ...	10" to 297' 11"
24.	Sandy slate, hard, ...	15' 8" to 313' 7"
25.	Sandstone, light, silicious, ...	44' 1" to 357' 8"
26.	COAL, soft and clod, ...	7" to 358' 3"
27.	Sandstone, light, silicious, ...	34' 1" to 392' 4"
28.	Clod and soft coal, ...	3' 9" to 396' 1"
29.	Sandstone, light, silicious, ...	4' 0" to 400' 1"
30.	BUCK MOUNTAIN BED, ...	13' 0" to 413' 1"

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Coal Field, Parts I and II.

Reno colliery, tunnel from west gangway bottom of slope.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, ?	9' 2" to 9' 2"
2.	Slate, ...	13' 9" to 22' 11"
3.	Fine blue rock, ...	7' 8" to 30' 7"
4.	SKIDMORE BED, ?	4' 6" to 35' 1"
5.	Slate, ...	6' 0" to 41' 1"
6.	Fine blue rock, ...	9' 0" to 50' 1"
7.	Slate, ...	3' 0" to 53' 1"
8.	Fine blue rock, ...	19' 3" to 72' 4"
9.	Slate, ...	3' 0" to 75' 4"
10.	Slate, ...	4' 6" to 79' 10"
11.	SEVEN-FOOT BED, ?	3' 8" to 83' 6"
12.	Fine blue rock, ...	13' 10" to 97' 4"
13.	Slate, ...	3' 8" to 101 0'
14.	Fine blue rock, ...	62' 2" to 163' 2"
15.	BUCK MOUNTAIN BED, ...	12' 5" to 175' 7"

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Logan colliery, tunnel to Buck Mountain bed.

L. A. Riley & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED.** Dip 13½° N., . . .	102′ 8″ to 102′ 8″	24′ 0″ to 24′ 0″
2.	Slate, ...	1′ 0″ to 103′ 8″	4″ to 24′ 4″
3.	Gray sandstone, .	184′ 0″ to 287′ 8″	60′ 2″ to 84′ 6″
4.	COAL bed. Dip 24¾° N., ...	12′ 0″ to 299′ 8″	5′ 0″ to 89′ 6″
5.	Hard slate, ...	56′ 0″ to 355′ 8″	24′ 6″ to 114′ 0″
6.	Gray sandstone, .	7′ 0″ to 362′ 8″	3′ 2″ to 117′ 2″
7.	Hard slate, ...	18′ 0″ to 380′ 8″	8′ 2″ to 125′ 4″
8.	COAL. Dip 27° N.,	6′ 0″ to 386′ 8″	2′ 8″ to 128′ 0″
9.	Hard SS. and fine conglomerate, . .	98′ 0″ to 484′ 8″	50′ 10″ to 178′ 10″
10.	COAL and slate, . .	3″ to 484′ 11″	2″ to 179′ 0″
11.	Dark soft sandstone,	51′ 9″ to 536′ 8″	26′ 10″ to 205′ 10″
12.	Dark slate. Dip 33° N., ...	17′ 0″ to 553′ 8″	9′ 3″ to 215′ 1″
13.	Hard sandstone, .	5′ 0″ to 558′ 8″	2′ 10″ to 217′ 11″
14.	Slate, ...	2′ 0″ to 560′ 8″	1′ 1″ to 219′ 0″
15.	Dark sandstone, .	5′ 0″ to 565′ 8″	2′ 10″ to 221′ 10″
16.	Slate, ...	22′ 0″ to 587′ 8″	12′ 5″ to 234′ 3″
17.	**SEVEN-FOOT BED.** Dip 38½° N., . . .	13′ 5″ to 601′ 1″	8′ 5″ to 242′ 8″
18.	Slate, ...	44′ 7″ to 645′ 8″	28′ 2″ to 270′ 10″
19.	COAL, ...	1′ 0″ to 646′ 8″	8″ to 271′ 6″
20.	Slate, ...	15′ 0″ to 661′ 8″	9′ 6″ to 281′ 0″
21.	COAL, ...	8′ 0″ to 669′ 8″	5′ 1″ to 286′ 1″
22.	Slate, ...	10′ 5″ to 680′ 1″	6′ 8″ to 292′ 9″
23.	COAL BED, ...	6′ 0″ to 686′ 1″	3′ 10″ to 296′ 7″
24.	Slate. Dip 36° to 45° N., ...	6′ 7″ to 692′ 8″	4′ 2″ to 300′ 9″
25.	**BUCK MOUNTAIN BED,**	14′ 0″ to 706′ 8″	9′ 0″ to 309′ 9″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Logan colliery, Diamond Drill bore-hole No. 3.

L. A. Riley & Co.

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Standpipe, ...	25′ 0″ to 25′ 0″	25′ 0″ to 25′ 0″
2.	Sandy slate. Dip 56° S., ...	18′ 1″ to 43′ 1″	10′ 1″ to 35′ 1″
3.	Hard gray SS., . .	4′ 7″ to 47′ 8″	2′ 7″ to 37′ 8″
4.	Slate with occasional streaks of COAL. Dip 58° S.,	37′ 11″ to 85′ 7″	20′ 8″ to 58′ 4″
5.	Slate and sandy slate, ...	3′ 0″ to 88′ 7″	1″ to 58′ 5″
6.	Sandstone and slate. Dip 57° S., . . .	5′ 1″ to 93′ 8″	2′ 9″ to 61′ 2″
7.	Slate, ...	7′ 5″ to 101′ 1″	4′ 9″ to 65′ 11″
8.	COAL, ...	2′ 8″ to 103′ 9″	1′ 10″ to 67′ 9″
9.	Slate, ...	2″ to 103′ 11″	2″ to 67′ 11″
10.	COAL and slate, . .	8′ 8″ to 112′ 7″	6′ 5″ to 74′ 4″
11.	Slate, ...	8′ 2″ to 120′ 9″	5′ 1″ to 79′ 5″
12.	COAL. Dip 34° S., .	10′ 5″ to 131′ 2″	5′ 10″ to 85′ 3″
13.	Slate, ...	5″ to 131′ 7″	3″ to 85′ 6″
14.	COAL, bone and slate, ...	8′ 11″ to 140′ 6″	5′ 0″ to 90′ 6″
15.	Slate. Dip 34° S., .	5′ 3″ to 145′ 9″	2′ 11″ to 93′ 5″
16.	Hard gray SS., . .	11′ 11″ to 157′ 8″	7′ 5″ to 100′ 10″
17.	Fine conglomerate,	26′ 2″ to 183′ 10″	17′ 10″ to 118′ 8″
18.	Slate with COAL seams. Dip 51° S.,	1′ 4″ to 185′ 2″	10″ to 119′ 6″
19.	Conglomerate, . .	9′ 5″ to 194′ 7″	6′ 0″ to 125′ 6″
20.	Sandstone and slate. Dip 28° S., . . .	1′ 7″ to 196′ 2″	9″ to 126′ 3″
21.	Fine conglomerate,	10′ 1″ to 206′ 3″	4′ 6″ to 130′ 9″
22.	Coarse cong., . . .	35′ 9″ to 242′ 0″	15′ 1″ to 145′ 10″
23.	Fine conglomerate. Dip 20° S., . . .	10′ 10″ to 252′ 10″	3′ 10″ to 149′ 8″
24.	Sandy slate, ...	10″ to 253′ 8″	3″ to 149′ 11″
25.	Coarse conglomerate. Dip 19° S., .	8′ 2″ to 261′ 10″	2′ 8″ to 152′ 7″
26.	Slate with COAL seams, ...	6″ to 262′ 4″	2′ to 152′ 9″
27.	Coarse cong., . . .	13′ 10″ to 276′ 2″	4′ 6″ to 157′ 3″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Hazel Dell colliery, rock slope, from surface to Buck Mountain bed.

L. A. Riley & Co.

No. of strata.	*Description.*	*Thicknesses measured on slope.*	*Thicknesses perpendicular to dip.*
1.	Timber, ...	170′ 9″ to 170′ 9″	170′ 9″ to 170′ 9″
2.	Fire clay, ...	4′ 8″ to 175′ 5″	3′ 0″ to 173′ 9″
3.	COAL, ...	6′ 2″ to 181′ 7″	3′ 10″ to 177′ 7″
4.	Slate, ...	12′ 1″ to 193′ 8″	7′ 9″ to 185′ 4″
5.	Hard sandstone. Dip 34° N., . .	55′ 6″ to 249′ 2″	38′ 0″ to 223′ 4″
6.	Soft dark slate, .	6′ 7″ to 255′ 9″	4′ 8″ to 228′ 0″
7.	Hard coarse SS.,	22′ 9″ to 278′ 6″	16′ 10″ to 244′ 10″
8.	COAL, ...	6″ to 279′ 0″	6″ to 245′ 4″
9.	Slate, ...	8′ 5″ to 287′ 5″	6′ 0″ to 251′ 4″
10.	COAL. Dip 35° N.,	5′ 2″ to 292′ 7″	3′ 6″ to 254′ 10″
11.	Slate, ...	18′ 2″ to 310′ 9″	12′ 2″ to 267′ 0″
12.	MAMMOTH BED,	33′ 3″ to 344′ 0″	24′ 3″ to 291′ 3″
13.	Slate, ...	17′ 0″ to 361′ 0″	13′ 8″ to 304′ 11″
14.	Fine cong., . . .	20′ 0″ to 381′ 0″	16′ 6″ to 321′ 5″
15.	Hard sandstone,	21′ 11″ to 402′ 11″	18′ 7″ to 340′ 0″
16.	COAL, ...	1″ to 403′ 0″	1″ to 340′ 1″
17.	Hard sandstone,	29′ 3″ to 432′ 3″	25′ 0″ to 365′ 1″
18.	Slate, ...	3′ 6″ to 435′ 9″	3′ 0″ to 368′ 1″
19.	COAL. Dip 37° N.,	2′ 6″ to 438′ 3″	2′ 0″ to 370′ 1″
20.	Slate, ...	20′ 11″ to 459′ 2″	17′ 0″ to 387′ 1″
21.	COAL, ...	7″ to 459′ 9″	10″ to 387′ 11″
22.	Slate, ...	37′ 3″ to 497′ 0″	29′ 8″ to 417′ 7″
23.	COAL. Dip 21° N.,	6′ 8″ to 503′ 8″	5′ 2″ to 422′ 9″
24.	Hard slate, . . .	18′ 7″ to 522′ 3″	14′ 8″ to 437′ 5″
25.	Hard sandstone,	32′ 6″ to 554′ 9″	25′ 3″ to 462′ 8″
26.	COAL, ...	3″ to 555′ 0″	3″ to 462′ 11″
27.	Slate, ...	2′ 10″ to 557′ 10″	1′ 3″ to 464′ 2″
28.	COAL BED. Dip 28° N., ...	10′ 0″ to 567′ 10″	7′ 8″ to 471′ 10″
29.	Slate, ...	15′ 7″ to 583′ 5″	13′ 4″ to 485′ 2″
30.	Sandstone, . . .	12′ 2″ to 595′ 7″	10′ 6″ to 495′ 8″
31.	Slate, ...	9″ to 596′ 4″	6″ to 496′ 2″
32.	COAL, ...	4″ to 596′ 8″	4″ to 496′ 6″
33.	Hard sandy slate,	4′ 3″ to 600′ 11″	3′ 10″ to 500′ 4″
34.	Sandstone, . . .	29′ 7″ to 630′ 6″	26′ 0″ to 526′ 4″
35.	COAL, ...	8″ to 631′ 2″	8″ to 527′ 0″
36.	Slate. Dip 37° N.,	47′ 10″ to 679′ 0″	39′ 8″ to 566′ 8″
37.	BUCK MOUNTAIN BED. Dip 28½° N., ...	33′ 0″ to 712′ 0″	15′ 8″ to 582′ 4″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Hazel Dell colliery, Water Level tunnel, from Mammoth bed to Buck Mountain bed.

L. A. Riley & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, . .	37' 9'' to 37' 9''	23' 0'' to 23' 0''
2.	Slate, ...	7' 0'' to 44' 9''	4' 0'' to 27' 0''
3.	Sandstone, ...	11' 6'' to 56' 3''	7' 0'' to 34' 0''
4.	Conglomerate, . . .	101' 0'' to 157' 3''	64' 0'' to 98' 0''
5.	COAL, ...	1' 6'' to 158' 9''	1' 3'' to 99' 3''
6.	Sandstone, ...	25' 0'' to 183' 9''	15' 0'' to 114' 3''
7.	COAL, ...	2' 0'' to 185' 9''	1' 2'' to 115' 5''
8.	Sandstone, ...	36' 0'' to 221' 9''	22' 0'' to 137' 5''
9.	COAL, ...	6' 0'' to 227' 9''	3' 6'' to 140' 11''
10.	Slate, ...	25' 0'' to 252' 9''	16' 0'' to 156' 11''
11.	Sandstone, ...	31' 0'' to 283' 9''	18' 0'' to 174' 11''
12.	COAL, ...	3' 0'' to 286' 9''	2' 0'' to 176' 11''
13.	Slate, ...	40' 0'' to 326' 9''	22' 0'' to 198' 11''
14.	Sandstone, ...	41' 0'' to 367' 9''	19' 6'' to 218' 5''
15.	COAL, ...	3' 0'' to 370' 9''	1' 2'' to 219' 7''
16.	Slate, ...	5' 0'' to 375' 9''	1' 2'' to 220' 9''
17.	Sandstone, ...	154' 0'' to 529' 9''	58' 6'' to 279' 3''
18.	BUCK MOUNTAIN BED, ...	65' 0'' to 594' 9''	15 0'' to 294' 3''

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Centralia colliery, Water Level tunnel, from surface to Buck Mountain bed.

L. A. Riley & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Slate, ...	146' 0'' to 146' 0''	124' 0'' to 124' 0'
2.	COAL, ...	16' 0'' to 162' 0''	4' 6'' to 128' 6''
3.	Sandstone, ...	6' 0'' to 168' 0''	5' 0'' to 133' 6''
4.	COAL, ...	4' 0'' to 172' 0''	3' 0'' to 136' 6''
5.	Slate, ...	4 0'' to 176' 0''	3' 6'' to 140' 0''
6.	Sandstone, ...	30' 0'' to 206' 0''	25' 0'' to 165' 0''
7.	COAL BED, ...	5' 0'' to 211' 0''	3' 0'' to 168' 0''
8.	Sandstone, ...	100' 0'' to 311' 0'	80' 6'' to 248' 6''
9.	COAL BED, ...	6' 0'' to 317' 0''	4' 3'' to 252' 9''
10.	Slate, ...	38' 0'' to 355' 0''	29' 0'' to 281' 9''
11.	MAMMOTH BED, . .	25' 0'' to 380' 0''	21' 0'' to 302' 9''
12.	Slate, ...	6' 0'' to 386' 0''	5' 0'' to 307' 9''

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
13.	Sandstone, ...	9′ 0″ to 395′ 0″	6′ 0′ to 313′ 9″
14.	Conglomerate, . . .	105′ 0″ to 500′ 0″	85′ 0″ to 398′ 9″
15.	COAL, ...	1′ 0″ to 501′ 0″	9″ to 399′ 6″
16.	Sandstone, ...	12′ 0″ to 513′ 0″	9′ 0″ to 408′ 6″
17.	COAL, ...	1′ 0″ to 514′ 0″	9″ to 409′ 3″
18.	Sandstone, ...	16′ 0″ to 530′ 0″	13′ 6″ to 422′ 9″
19.	COAL BED, ...	5′ 0″ to 535′ 0″	4′ 0″ to 426′ 9″
20.	Slate, ...	20′ 0″ to 555′ 0″	16′ 0″ to 442′ 9″
21.	Sandstone, ...	35′ 0″ to 590′ 0″	28′ 0″ to 470′ 9″
22.	COAL, ...	2 0″ to 592′ 0′	1′ 6″ to 472′ 3″
23.	Slate, ...	1′ 0″ to 593′ 0″	9″ to 473′ 0″
24.	COAL, ...	4′ 0′ to 597′ 0″	3′ 0″ to 476′ 0″
25.	Slate, ...	16′ 0″ to 613′ 0″	12′ 6″ to 488′ 6″
26.	COAL, ...	1′ 6″ to 614′ 6″	1′ 0″ to 489′ 6″
27.	Sandstone, ...	23′ 6″ to 638′ 0″	19′ 0″ to 508′ 6″
28.	COAL, ...	2 0″ to 640′ 0′	1′ 6″ to 510′ 0″
29.	Sandstone, ...	46′ 0″ to 686′ 0″	36′ 6″ to 546′ 6″
30.	BUCK MOUNTAIN BED, ...	24′ 0″ to 710′ 0″	12′ 6″ to 559′ 0″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Continental colliery, Water Level tunnel, from surface to Buck Mountain bed.

Lehigh Valley Coal Company.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Wash, ...	212′ 0″ to 212′ 0″	130′ 0″ to 130′ 0″
2.	PRIMROSE BED, .	13′ 0″ to 225′ 0′	10′ 0″ to 140′ 0″
3.	Strata, ...	16′ 9″ to 241′ 9″	11′ 9″ to 151′ 9″
4.	COAL, ...	4 5″ to 246′ 2′	3′ 2″ to 154′ 11″
5.	Strata, ...	151′ 7″ to 397′ 9″	106′ 3″ to 261′ 2″
6.	COAL, soft, . . .	1′ 0″ to 398′ 9″	8″ to 261′ 10″
7.	Strata, ...	34′ 5″ to 433′ 2″	24′ 3″ to 286′ 1″
8.	MAMMOTH BED. Dip 44½°, . . .	21′ 5″ to 454′ 7′	15′ 0″ to 301′ 1″
9.	Strata, very hard,	166′ 0″ to 620 7″	127′ 2″ to 428′ 3″
10.	Soft, mining, . .	1′ 0″ to 621 7″	9″ to 429′ 0″
11.	Strata, ...	19′ 0″ to 640′ 7″	14′ 7″ to 443′ 7′
12.	COAL, soft, . . .	1′ 0″ to 641′ 7″	9″ to 444′ 4″
13.	Strata, ...	78′ 5″ to 720′ 0′	60′ 0′ to 504′ 4″
14.	COAL, soft, . . .	7″ to 720′ 7″	6″ to 504′ 10″
15.	Strata, ...	4′ 6″ to 725′ 1″	3′ 5″ to 508′ 3″
16.	COAL, ...	6″ to 725′ 7	5″ to 508′ 8″

No of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
17.	Strata, ...	30′ 0″ to 755′ 7′	23′ 0″ to 531′ 8″
18.	COAL, leader, . .	2′ 1″ to 757′ 8″	1′ 7″ to 533′ 3″
19.	Strata, ...	96′ 9″ to 854′ 5″	74′ 1″ to 607′ 4″
20.	BUCK MOUNTAIN BED. Dip 50°S.,	15′ 4″ to 869′ 9″	18 2″ to 625′ 6′

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Continental colliery, Diamond Drill bore-hole, No. 53 from surface through Buck Mountan bed.

Lehigh Valley Coal Co.

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Stand pipe, ...	47′ 2″ to 47′ 2″	47′ 2″ to 47′ 2″
2.	Sandstone and sandy slate, broken, ...	98′ 11″ to 146′ 1″	95′ 6″ to 142′ 8″
3.	Sandy slate and slate, .	28′ 8″ to 174′ 9″	27′ 8″ to 170′ 4″
4.	HOLMES BED, ...	12′ 7″ to 187′ 4″	12′ 2″ to 182′ 6″
5.	Slate, ...	1′ 9″ to 189′ 1″	1′ 8″ to 184′ 2″
6.	Hard, fine gray SS. . .	12′ 10″ to 201′ 11″	12′ 4″ to 196′ 6″
7.	Slate and sandy slate, .	10′ 3″ to 212′ 2″	10′ 1″ to 206′ 7″
8.	COAL, ...	1′ 1″ to 213′ 3″	1′ 0″ to 207′ 7″
9.	Slate and sandy slate, .	1′ 5″ to 214′ 8″	1′ 4″ to 208′ 11″
10.	Hard, gray sandstone,	23′ 3″ to 237′ 11″	22′ 11″ to 231′ 10″
11.	Fine conglomerate, . .	30′ 4″ to 268′ 3″	30′ 0″ to 261′ 10″
12.	Slate, ...	5″ to 268′ 8″	5″ to 262′ 3″
13.	Fine conglomerate, . .	5′ 2″ to 273′ 10″	5′ 0″ to 267′ 3″
14.	SS. and sandy slate, . .	4′ 9″ to 278′ 7″	4′ 8″ to 271′ 11″
15.	Fine conglomerate, . .	16′ 1″ to 294′ 8″	15′ 10″ to 287′ 9″
16.	Hard, gray sandstone,	30′ 8″ to 325′ 4″	30′ 5″ to 318′ 2″
17.	Slate and sandy slate, .	18′ 6″ to 343′ 10″	18′ 4″ to 336′ 6″
18.	MAMMOTH BED, . . .	26′ 2″ to 370′ 0″	26′ 1″ to 362′ 7″
19.	Slate, ...	4′ 2″ to 374′ 2″	4′ 2″ to 366′ 9″
20.	Fine conglomerate, . .	49′ 0″ to 414′ 11″	40 8″ to 407′ 5″
21.	Slate, with seams of COAL, ...	1′ 3″ to 416′ 2″	1′ 3″ to 408′ 8″
22.	Fine conglomerate, . .	17′ 6″ to 433 8″	17′ 5″ to 426′ 1″
23.	SS. and sandy slate, . .	8′ 0″ to 441′ 8″	8′ 0″ to 434′ 1″
24.	Fine conglomerate, . .	17′ 7″ to 459′ 3″	17′ 6″ to 451′ 7″
25.	Slate, ...	4′ 3″ to 463′ 6″	4′ 3″ to 455′ 10″
26.	COAL, ...	11″ to 464′ 5′	11″ to 456′ 9″
27.	Slate, ...	3′ 6″ to 467′ 11″	3′ 6″ to 460′ 3′
28.	COAL, ...	8″ to 468′ 7″	8″ to 460′ 11″
29.	Slate, ...	18′ 1″ to 486′ 8″	18′ 0″ to 478′ 11′

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
30.	COAL, with small seam of slate,	2′ 7″ to 489′ 3″	2′ 7″ to 481′ 6″
31.	Slate,	9′ 3″ to 498′ 6″	9′ 3″ to 490′ 9″
32.	Hard, gray sandstone,	16′ 1″ to 514′ 7″	16′ 0″ to 506′ 9″
33.	Fine conglomerate,	32′ 5″ to 547′ 0″	32′ 4″ to 539′ 1″
34.	Hard, gray sandstone,	2′ 0″ to 549′ 0″	2′ 0″ to 541′ 1″
35.	Slate and sandy slate,	23′ 1″ to 572′ 1′	23′ 0″ to 564′ 1′
36.	Fine conglomerate,	11″ to 573′ 0″	11″ to 565′ 0″
37.	Slate and sandy slate,	18′ 3″ to 591′ 3″	18′ 2″ to 583′ 2″
38.	COAL,	2′ 9″ to 594′ 0″	2′ 9″ to 585′ 11″
39.	Sandy slate and slate,	28′ 5″ to 622′ 5″	28′ 4″ to 614′ 3″
40.	Hard, gray sandstone,	8′ 3″ to 630′ 8″	8′ 3″ to 622′ 6″
41.	Fine conglomerate,	1′ 11″ to 632′ 7″	1′ 11″ to 624′ 5″
42.	COAL BED,	16′ 8″ to 649′ 3″	16′ 8″ to 641′ 1″
43.	Slate,	1′ 1″ to 650′ 4″	1′ 1″ to 642′ 2″
44.	Hard, gray sandstone,	12′ 7″ to 662′ 11″	12′ 7″ to 654′ 9′
45.	Fine conglomerate,	29′ 7″ to 692′ 6″	29′ 6″ to 684′ 3″
46.	Coarse conglomerate,	15′ 5″ to 707′ 11″	15′ 5″ to 699′ 8″
47.	Fine conglomerate,	13′ 11″ to 721′ 10″	13′ 11″ to 713′ 7″
48.	Coarse conglomerate,	70′ 2″ to 792′ 0″	69′ 10″ to 783′ 5″
49.	Slate,	5″ to 792′ 5″	5″ to 783′ 10″
50.	COAL,	10″ to 793′ 3″	10″ to 784′ 8″
51.	Slate,	7″ to 793′ 10″	7″ to 785′ 3″
52.	Hard, gray sandstone,	12′ 0″ to 805′ 10″	12′ 0″ to 797′ 3″
53.	Fine conglomerate,	9′ 0″ to 814′ 10″	9′ 0″ to 806′ 3″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Coal Field, Parts I and II.

North Ashland colliery, tunnel from Mammoth to Buck Mountain bed, 1st lift of slope.

P. & R. C. & I. Co.

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	MAMMOTH BED. Dip 44°,	40′ 0″ to 40′ 0″	28′ 0″ to 28′ 0″
2.	Hard slate,	1′ 0″ to 41′ 0″	8″ to 28′ 8″
3.	Sandstone,	20′ 6″ to 61′ 6″	14′ 3″ to 42′ 11″
4.	Conglomerate,	5′ 6″ to 67′ 0″	3′ 10″ to 46′ 9″
5.	Hard slate,	1′ 0″ to 68′ 0″	8″ to 47′ 5″
6.	Sandstone,	13′ 0″ to 81′ 0″	9′ 0″ to 56′ 5″
7.	Hard slate,	1′ 0″ to 82′ 0″	8′ to 57′ 1″
8.	Conglomerate,	20′ 0″ to 102′ 0″	13′ 11″ to 71′ 0″
9.	Soft slate,	1′ 0″ to 103′ 0″	8″ to 71′ 8″
10.	COAL,	2″ to 103′ 2″	1″ to 71′ 9″
11.	Sandstone,	21′ 10″ to 125′ 0″	15′ 8″ to 87′ 5″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
12	Conglomerate, . . .	24' 0" to 149' 0"	17' 0" to 104' 5"
13.	Hard slate, ...	2' 0" to 151' 0"	1' 5" to 105' 10"
14.	Sandstone, ...	7' 0" to 158' 0"	4' 11" to 110' 9"
15.	Hard slate, ...	12' 0" to 170' 0"	8' 6" to 119' 3"
16.	SKIDMORE BED. Dip 46°, ...	1' 6" to 171' 6"	1' 0" to 120' 3"
17.	Soft slate, ...	2' 6" to 174' 0"	1' 10" to 122' 1"
18.	COAL, ...	1' 6" to 175' 6"	1' 2" to 123' 3"
19.	Soft slate, ...	24' 6" to 200' 0"	18' 9" to 142' 0"
20.	SEVEN-FOOT BED. Dip 51°, ...	3' 6" to 203' 6"	3' 0" to 145' 0"
21.	Soft slate, ...	5' 6" to 209' 0"	4' 3" to 149' 3"
22.	Sandstone, ...	17' 0" to 226' 0"	13' 3" to 162' 6"
23.	Conglomerate, . . .	22' 0" to 248' 0"	17' 6" to 180' 0"
24.	COAL, ...	6" to 248' 6"	4" to 180' 4"
25.	Sandstone, ...	53' 6" to 302 0"	41' 9" to 222' 1"
26.	Hard slate, ...	21' 6" to 323' 6"	16' 9" to 238' 10"
27.	Conglomerate, . . .	20' 6" to 344' 0"	16' 0" to 254' 10"
28.	Hard slate, ...	31' 8" to 375' 8"	24' 9" to 279' 7"
29.	COAL, ...	2' 4" to 378' 0"	2' 0" to 281' 7"
30.	Slate, ...	5' 0" to 383' 0"	3' 11" to 285' 6"
31.	COAL, ...	9" to 383' 9"	5" to 285' 11"
32.	Slate, ...	5' 3" to 389' 0"	4' 1" to 290' 0"
33.	BUCK MOUNTAIN BED. Dip 52°, . .	22' 6" to 411' 6"	18' 0" to 308' 0"

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

North Ashland colliery, Anderson & Co., tunnel.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Refuse, ...	5' 0" to 5' 0"
2.	Mammoth bed, ...	23' 9" to 28' 9"
3.	Slate, ...	3' 6" to 32' 3'
4.	Rock, ...	81' 0" to 113' 3"
5.	Slate, ...	11' 4" to 124' 7"
6.	COAL, ...	6" to 125' 1"
7.	Slate, ...	1' 6" to 126' 7"
8.	Rock, ...	12' 8" to 139' 3"
9.	Slate, ...	7' 10" to 147' 1"
10.	COAL, ...	3' 8" to 150' 9"
11.	Slate, ...	3' 9" to 154' 6"
12.	Rock, ...	22' 0" to 176' 6"

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
13.	Slate,	3' 0'' to 179' 6''
14.	Rock,	12' 0'' to 191' 6''
15.	Slate,	3' 0'' to 194' 6''
16.	Rock,	24' 0'' to 218' 6''
17.	Slate,	10' 8'' to 229' 2''
18.	Rock,	31' 0'' to 260' 2''
19.	Slate,	21' 6'' to 281' 8''
20.	COAL (COAL and slate),	3' 1'' to 284' 9''
21.	Slate,	1' 3'' to 286' 0''
22.	COAL,	7' to 286' 7''
23.	Slate,	8' 0'' to 294' 7''
24.	Bone,	5'' to 295' 0''
25.	COAL,	4' 7'' to 299' 7''
26.	Slate,	2'' to 299' 9''
27.	COAL (COAL, slate and bone),	6' 1'' to 305' 10''

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Potts colliery, tunnel from Little Tracy bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Sandstone,	49' 9'' to 49' 9''
2.	Sandy slate,	29' 10'' to 79' 7''
3.	Little Tracy bed,	2' 6'' to 82' 1''
4.	Slate,	24' 10'' to 106' 11''
5.	Dirt,	10'' to 107' 9''
6.	Sandy slate,	69' 8'' to 177' 5''
7.	Big Tracy bed,	5' 10'' to 183' 3''
8.	Sandstone,	72' 2'' to 255' 5''
9.	Leader of dirt,	10'' to 256' 3''
10.	Slate,	14' 7'' to 270' 10''
11.	Little Diamond bed,	2' 6'' to 273' 4''
12.	Sandy slate,	96' 6'' to 369' 10''
13.	Dirt,	10'' to 370' 8''
14.	Sandstone,	29' 3'' to 399' 11''
15.	Big Diamond bed,	6' 1'' to 406' 0''
16.	Hard sandstone,	82' 2'' to 488' 2''
17.	Sandy slate,	23' 6'' to 511' 8''
18.	BIG ORCHARD BED,	3' 11'' to 515' 7''
19.	Slate and sandstone,	18' 9'' to 534' 4''
20.	LITTLE ORCHARD BED,	2' 4'' to 536 8''
21.	Sandstone and slate,	138' 11'' to 675' 7'
22.	PRIMROSE BED,	7' 9'' to 683' 4'

No. of strata.	Description.	Thicknesses perpendicular to dip.
23.	Sandstone and slate,	102' 9" to 786' 1"
24.	HOLMES BED,	5' 2" to 791' 3"
25.	Slate,	11' 2" to 802' 5"
26.	Coal,	1' 6" to 803' 11"
27.	Sandstone and slate,	121' 10" to 925' 9"
28.	MAMMOTH BED,	23' 11" to 949' 8"
29.	Slate,	35' 11" to 985' 7"
30.	Rock,	53' 2" to 1038' 9"
31.	SKIDMORE BED,	3' 4" to 1042' 1"
32.	Slate,	13' 5" to 1055' 6"
33.	Slate with iron ore balls,	3' 8" to 1059' 2"
34.	Hard gray sandstone,	20' 4" to 1079' 6"
35.	COAL,	1' 5" to 1080' 11"
36.	Slate,	28' 9" to 1109' 8"
37.	COAL,	1' 1" to 1110' 9"
38.	Slate,	7' 11" to 1118' 8"
39.	COAL,	1' 5" to 1120' 1"
40.	Slate,	5' 0" to 1125' 1"
41.	COAL,	3' 3" to 1128' 4"
42.	Slate,	4' 3" to 1132' 7"
43	Conglomerate,	33' 11" to 1166' 6"
44.	BUCK MOUNTAIN BED,	11' 4" to 1177' 10"

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Locust Run colliery, general section and bore-hole near reservoir.

P. & R. C. & I. Co.

No. of strata.	Description.	Thicknesses perpendicular to dip.
1.	MAMMOTH BED,	23' 0" to 23' 0"
2.	Strata,	51' 0" to 74' 0"
3.	FOUR-FOOT BED,	5' 0" to 79' 0"
4.	Strata,	19' 0" to 98' 0"
5.	SKIDMORE BED,	12' 0" to 110' 0"
6.	Strata,	43' 0" to 153' 0"
7.	COAL,	2' 9" to 155' 9"
8.	Strata,	65' 0" to 220' 9"
9.	COAL,	6" to 221' 3"
10.	Strata,	41' 0" to 262' 3"
11.	COAL,	1' 6" to 263' 9"
12.	Strata,	21' 0" to 284' 9"
13.	COAL and dirt,	7' 1" to 291' 10"
14.	Dark slate,	10' 3" to 302' 1"
15.	COAL BED,	8' 1" to 310' 2"

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
16.	Slate,	3′ 0″ to 313′ 2″
17.	Sandstone,	6′ 6″ to 319′ 8″
18.	Sandstone,	15′ 2″ to 334′ 10″
19.	Slate,	10″ to 335′ 8″
20.	Sandstone,	18′ 9″ to 354′ 5″
21.	Slate,	4″ to 354′ 9″
22.	Sandstone,	12′ 0″ to 366′ 9″
23.	Slate,	10″ to 367′ 7″
24.	Conglomerate,	1′ 2″ to 368′ 9″
25.	Slate,	6″ to 369′ 3″
26.	Conglomerate,	82′ 7″ to 451′ 10″
27.	Sandstone,	9′ 9″ to 461′ 7″
28.	Sandstone,	8′ 7″ to 470′ 2″
29.	Slate,	2′ 9″ to 472′ 11″
30.	Sandstone,	48′ 11″ to 521′ 10″
31.	Conglomerate,	1′ 8″ to 523′ 6″
32.	Sandstone,	1′ 8″ to 525′ 2″
33.	Conglomerate,	22′ 10″ to 548′ 0″
34.	COAL,	2′ 10″ to 550′ 10″
35.	Slate,	1′ 0″ to 551′ 10″
36.	Conglomerate,	85′ 6″ to 637′ 4″
37.	COAL,	1′ 6″ to 638′ 10″
38.	Slate,	6′ 10″ to 645′ 8″
39.	Conglomerate,	12′ 1″ to 657′ 9″

See Columnar Section Sheet No. III and Mine Sheet No. IV, Atlas Western Middle Coal Field, Parts I and II.

Big Mine Run colliery, Diamond Drill bore-hole.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Sandstone,	41′ 6″ to 41′ 6″
2.	COAL,	3″ to 41′ 9″
3.	Fine-grained blue rock,	60′ 1″ to 101′ 10″
4.	Gray rock,	13′ 4″ to 115′ 2″
5.	Slate,	2″ to 115′ 4″
6.	Conglomerate,	2′ 5″ to 117′ 9″
7.	Hard gray sandstone,	4′ 3″ to 122′ 0″
8.	Slate,	2′ 10″ to 124′ 10″
9.	COAL BED,	4′ 5″ to 129′ 3″
10.	Slate,	7′ 10″ to 137′ 1″
11.	Sandstone,	17′ 4″ to 154′ 5″
12.	COAL BED,	5′ 0″ to 159′ 5″
13.	Slate,	7″ to 160′ 0″
14.	Light gray rock and conglomerate mixed,	21′ 2″ to 181′ 2″
15.	Gray sandstone,	16′ 3″ to 197′ 5″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
16.	Conglomerate,	4' 3" to 201' 8"
17.	Hard gray rock,	5' 8" to 207' 4"
18.	Coal,	2' 1" to 209' 5"
19.	Slate,	13' 2" to 222' 7"
20.	Gray rock mixed with pebbles,	16' 2" to 238' 9"
21.	Conglomerate,	2' 2" to 240' 11"
22.	Mammoth bed,	22' 0" to 262' 11"

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Big Mine Run colliery, Water level tunnel, from Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Mammoth bed. Dip 40° S.,	34' 3" to 34' 3"	22' 0" to 22' 0"
2.	Slate,	15' 0" to 49' 3"	9' 8" to 31' 8"
3.	Conglomerate,	35' 0" to 84' 3"	23' 0" to 54' 8"
4.	Sandstone,	75' 2" to 159' 5"	50' 3" to 104 11"
5.	Coal and slate. Dip 42° S.,	3' 10" to 163' 3"	2' 6" to 107' 5"
6.	Fine sandstone,	29' 6" to 192' 9"	18' 7' to 126' 0"
7.	Coal. Dip 36° S.,	6" to 193' 3"	4" to 126' 4"
8.	Fine sandstone,	18' 0' to 211' 3"	10' 7" to 136' 11"
9.	Slate,	5' 0" to 216' 3"	3' 0" to 139' 11"
10.	Slate, coal and dirt. Dip 37° S.,	8' 0" to 224' 3"	4' 2" to 144' 1"
11.	Fine dark SS.,	35' 0" to 259' 3"	20' 1" to 164' 2"
12.	Cong. Dip 32° S.,	73' 5" to 332' 8"	38' 10" to 203' 0"
13.	Slate. Dip 32° S.,	1' 7" to 334' 3"	10" to 203' 10"
14.	Conglomerate,	9' 4" to 343' 7"	5' 3" to 209' 1"
15.	Sandy slate. Dip 36° S.,	8" to 344' 3"	4" to 209' 5"
16.	Conglomerate,	24' 3" to 368' 6"	11' 4" to 220' 9"
17.	Fine sandstone. Dip 19° S.,	9" to 369' 3"	3" to 221' 0"
18.	Cong. Dip 16° S.,	35' 0" to 404' 3"	11' 10" to 232' 10"
19.	Slate,	5' 0" to 409' 3"	1' 6" to 234' 4"
20.	Hard gray SS.,	14' 6" to 423' 9"	8' 5" to 242' 9"
21.	Coal and slate. Dip 40° S.,	6" to 424' 3"	4" to 243' 1"
22.	Hard gray SS.,	49' 9" to 474' 0"	32' 0" to 275' 1'
23.	Slate. Dip 40° S.,	3" to 474' 3"	2" to 275' 3"
24.	Hard gray SS.,	33' 3" to 507' 6"	21' 4" to 296' 7"

25. COAL. Dip 43° S.,	9'' to 508' 3''	6'' to 297' 1''
26. Hard gray SS., . .	46' 0'' to 554' 3''	27' 2'' to 324' 3''
27. Fine dark slaty sandstone. Dip 5° to 26° S., . . .	189 0'' to 743' 3''	30' 0'' to 354' 3''
28. BUCK MOUNTAIN BED. Dip 13° S.,	61' 0'' to 804' 3''	17' 10'' to 372' 1''

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Bast colliery, tunnel from overturned dip to Mammoth bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
1.	Soft sandstone, ...		44' 0'' to 44' 0''
2.	Gritty slate, ...		16' 6'' to 60' 6''
3.	Sandstone, ...		13' 0'' to 73' 6''
4.	Slate, ...		15' 0'' to 88' 6''
5.	Sandstone, ...		5' 6'' to 94' 0''
6.	COAL, ...	COAL BED.	5' 0'' to 99' 0''
7.	Slate, ...		3' 0'' to 102' 0''
8.	COAL, ...		2' 4'' to 104' 4''
9.	Sandstone, ...		9' 0'' to 113' 4''
10.	Sandstone, soft, ...		16' 2'' to 129' 6''
11.	Slate, ...		9' 6'' to 139' 0''
12.	Sandstone, ...		4' 0'' to 143' 0''
13.	Slate, ...		9' 6'' to 152' 6''
14.	Sandstone, ...		2' 0'' to 154' 6''
15.	Slate, ...		6' 0'' to 160' 6''
16.	COAL, ...		6'' to 161' 0''
17.	Slate, ...		6' 6'' to 167' 6''
18.	COAL, ...		9'' to 168' 3'
19.	Sandstone, soft, ...		23' 6'' to 191' 9''
20.	Slate, ...		2' 6'' to 194' 3''
21.	Sandstone, ...		8' 0'' to 202' 3''
22.	Fine conglomerate, ...		3' 0'' to 205' 3''
23.	COAL BED, ...		3' 9'' to 209' 0''
24.	Slate, ...		13' 0'' to 222' 0''
25.	Gray sandstone, ...		33' 0'' to 255' 0''
26.	Slate, ...		1' 8'' to 256' 8''
27.	COAL BED, ...		11' 10'' to 268' 6''
28.	Slate, ...		1' 6'' to 270' 0''
29.	Hard sandstone, ...		43' 0'' to 313' 0''
30.	COAL BED, ...		3' 0'' to 316' 0''
31.	Slate, ...		9' 6'' to 325' 6''
32.	Hard sandstone, ...		16' 6'' to 342' 0''
33.	Slate, ...		6' 0'' to 348' 0''
34.	MAMMOTH BED, ...		14' 0'' to 362' 0''

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Western Middle Field, Parts I and II.

Pioneer colliery, section from Mammoth to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED,	25′ 0″ to 25′ 0″
2.	Strata,	36′ 0″ to 61′ 0″
3.	COAL BED,	4′ 0″ to 65′ 0″
4.	Strata,	38′ 0″ to 103′ 0″
5.	COAL,	1′ 0″ to 104′ 0″
6.	Strata,	24′ 0″ to 128′ 0″
7.	COAL,	1′ 0″ to 129′ 0″
8.	Strata,	40′ 0″ to 169′ 0″
9.	BUCK MOUNTAIN BED,	4′ 0″ to 173′ 0″
10.	Sandstone,	7′ 0″ to 180′ 0″

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Tunnel colliery, tunnels and surface developments.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	COAL BED,	5′ 0″ to 5′ 0″
2.	Sandstone and slate,	69′ 0″ to 74′ 0″
3.	COAL,	1′ 6″ to 75′ 6″
4.	Hard sandstone,	45′ 0″ to 120′ 6″
5.	Slate,	4′ 0″ to 124′ 6″
6.	COAL,	1′ 0″ to 125′ 6″
7.	Slate,	37′ 6″ to 163′ 0″
8.	Slaty rock,	11′ 6″ to 174′ 6″
9.	Slate,	3′ 0″ to 177′ 6″
10.	Rock,	10′ 0″ to 187′ 6′
11.	Hard sandstone and slate,	22′ 0″ to 209′ 6″
12.	COAL BED,	4′ 0″ to 213′ 6′
13.	Sandstone and slate,	186′ 0″ to 399′ 6″
14.	COAL BED,	6′ 6″ to 406′ 0″
15.	Hard sandstone and fine conglomerate (mixed),	28′ 6″ to 434′ 6″
16.	Slate,	42′ 0″ to 476′ 6″
17.	Sandstone,	52′ 6″ to 529′ 0″
18.	COAL BED,	5′ 0″ to 534′ 0″
19.	Soft slate and sandstone,	89′ 0″ to 623′ 0″
20.	COAL BED,	5′ 6″ to 628′ 6″
21.	Sandstone,	25′ 0″ to 653′ 6″
22.	Slate,	35′ 0″ to 688′ 6′

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No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
23.	PRIMROSE BED,	15′ 4′ to 703′ 10′
24.	Slate,	12′ 4″ to 716′ 2″
25.	Hard sandstone,	13′ 4″ to 729′ 6′
26.	Hard slate,	18′ 0″ to 747′ 6″
27.	COAL BED,	3′ 0′ to 750′ 6′
28.	Hard rock,	100′ 6″ to 851′ 0″
29.	COAL BED,	6′ 0″ to 857′ 0″
30.	Hard gray rock,	138′ 2″ to 995′ 2″
31.	MAMMOTH BED,	23′ 0″ to 1018′ 2″
32.	Rock,	32′ 0′ to 1050′ 2″
33.	SKIDMORE BED,	4′ 0″ to 1054′ 2″
34.	Rock,	35′ 0″ to 1089′ 2″
35.	COAL,	1 0″ to 1090′ 2′
36.	Sandstone,	32′ 0″ to 1122′ 2″
37.	COAL,	1″ to 1122 3″
38.	Sandstone,	40′ 0″ to 1162′ 3″
39.	Slate,	2′ 0″ to 1164′ 3″
40.	Rock,	32 0″ to 1196′ 3″
41.	SEVEN-FOOT BED?	1′ 0″ to 1197′ 3″
42.	Rock,	11′ 0″ to 1208 3″
43.	COAL,	——— ———
44.	Rock,	16′ 0′ to 1224′ 3″
45.	Slate,	5′ 0″ to 1229′ 3″
46.	Iron ore,	6′ 0″ to 1235′ 3″
47.	Black band,	3′ 6″ to 1238′ 9″
48.	Interval,	3′ 0″ to 1241 9″
49.	Slate,	15′ 0″ to 1256′ 9″
50.	BUCK MOUNTAIN BED,	5′ 5″ to 1262′ 2″

See Columnar Section Sheet No. IV and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Preston colliery No. 2, tunnels.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Sandstone,	16′ 2″ to 16′ 2″
2.	Sandstone,	12′ 7″ to 28′ 9′
3.	Slate,	1′ 9′ to 30′ 6″
4.	COAL BED. Dip 64°,	3′ 4″ to 33′ 10″
5.	Sandstone,	5′ 10″ to 39′ 8″
6.	Soft slate,	1′ 4″ to 41′ 0″
7.	Hard slate,	1′ 11″ to 42′ 11″
8.	Sandstone,	22′ 6″ to 65′ 5″
9.	Sandstone,	25′ 2″ to 90′ 7″
10.	COAL. Dip 60°,	8″ to 91′ 3″
11.	Sandstone,	8′ 8″ to 99′ 11″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
12.	Hard slate,	6′ 1″ to 106′ 0″
13.	Soft slate,	1′ 4″ to 107′ 4″
14.	COAL,	8″ to 108′ 0″
15.	Sandstone,	15′ 7″ to 123′ 7″
16.	ORCHARD BED. Dip 62°,	6′ 2″ to 129′ 9″
17.	Sandstone,	44′ 5″ to 174′ 2″
18.	Soft black sandstone,	1′ 9″ to 175′ 11″
19.	Sandstone,	39′ 0″ to 214′ 11″
20.	Slate,	3′ 6″ to 218′ 5″
21.	PRIMROSE BED. Dip 65°,	5′ 5″ to 223′ 10″
22.	Sandstone,	2′ 8″ to 226′ 6″
23.	COAL, slate and refuse,	11″ to 227′ 5″
24.	Sandstone,	58′ 0″ to 285′ 5″
25.	Slate,	1′ 10″ to 287′ 3″
26.	COAL BED. Dip 62°,	3′ 1″ to 290′ 4″
27.	Slate,	11″ to 291′ 3″
28.	Sandstone,	17′ 8″ to 308′ 11″
29.	Slate,	5′ 4″ to 314′ 3″
30.	Sandstone,	17′ 8″ to 331′ 11″
31.	Slate,	10″ to 332′ 9″
32.	Hard sandstone,	54′ 8″ to 387′ 5″
33.	Slate,	9′ 8″ to 397′ 1″
34.	HOLMES BED. Dip 57°,	10′ 1″ to 407′ 2″
35.	Slate,	5′ 0″ to 412′ 2″
36.	Hard black slate,	1′ 2″ to 413′ 4″
37.	Sandstone,	83′ 10″ to 497′ 2″
38.	Hard slate,	16′ 9″ to 513′ 11″
39.	Free slate,	6′ 8″ to 520′ 7″
40.	MAMMOTH BED,	24′ 0″ to 544′ 7″
41.	Slate,	7′ 6″ to 552′ 1″
42.	Sandstone,	50′ 0″ to 602′ 1″
43.	COAL,	2′ 0″ to 604′ 1″
44.	Slate,	21′ 0″ to 625′ 1″
45.	COAL,	2′ 8″ to 627′ 9″
46.	Slate,	21′ 0″ to 648′ 9′
47.	COAL, slate and refuse,	1′ 0″ to 649′ 9″
48.	Slate,	10′ 0″ to 659′ 9″
49.	Sandstone,	21′ 0″ to 680′ 9″
50.	Fine conglomerate,	18′ 0″ to 698′ 9″
51.	Slate,	5′ 6″ to 704′ 3″
52.	COAL, birdseye,	1′ 10″ to 706′ 1′
53.	Sandstone,	56′ 0″ to 762′ 1″
54.	Slate,	18′ 0″ to 780′ 1″
55.	Sandstone,	3′ 0″ to 783′ 1″
56.	Slate and bone,	4′ 0″ to 787′ 1″
57.	BUCK MOUNTAIN BED,	16 7″ to 803′ 8″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Hammond colliery tunnel, from Primrose bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Soft slate, dirt, &c.,	8′ 0″ to 8′ 0″	4′ 9″ to 4′ 9″
2.	Hard slate, ...	11′ 0″ to 19′ 0″	5′ 4″ to 10′ 1″
3.	COAL BED, ...	6′ 0″ to 25′ 0″	3′ 8″ to 13′ 9′
4.	Hard slate, ...	4′ 6″ to 29′ 6″	3′ 2″ to 16′ 11″
5.	COAL, ...	6″ to 30′ 3″	7″ to 17′ 6″
6.	Soft slate, ...	4′ 0″ to 34′ 0″	2′ 7″ to 20′ 1″
7.	COAL, ...	9″ to 34 ′9′	5″ to 20′ 6″
8.	Soft slate, ...	6′ 9″ to 41′ 6″	4′ 7″ to 25′ 1″
9.	COAL, ...	6′ to 42′ 0″	6″ to 25′ 7″
10.	Soft slate, ...	2′ 6″ to 44′ 6″	1′ 3″ to 26′ 10″
11.	Sand rock, ...	51′ 6″ to 96′ 0″	34′ 9″ to 61′ 7″
12.	Hard slate,.	12′ 0′ to 108′ 0″	8′ 2″ to 69′ 9″
13.	COAL, ...	4″ to 108′ 4″	4″ to 70′ 1″
14.	Hard slate, ...	2′ 8″ to 111′ 0″	1′ 10″ to 71′ 11″
15.	Soft slate, ...	2′ 0″ to 113′ 0″	1′ 5″ to 73′ 4″
16.	COAL, good leader. Dip 42°, ...	4′ 0″ to 117′ 0″	2′ 10″ to 76′ 2″
17.	Sand rock, ...	9′ 0″ to 126′ 0″	6′ 7″ to 82′ 9″
18.	Soft slate, ...	1′ 9″ to 127′ 9″	10″ to 83′ 7″
19.	Sand rock, ...	5′ 9″ to 133′ 6″	4′ 0″ to 87′ 7″
20.	Hard slate, ...	6′ 6″ to 140′ 0″	4′ 11″ to 92′ 6″
21.	Sand rock, ...	13′ 0″ to 153′ 0″	8′ 11″ to 101′ 5″
22.	Hard slate, ...	9′ 0″ to 162′ 0″	6′ 10″ to 108′ 3″
23.	Sand rock, . . .	2′ 0″ to 164′ 0″	1′ 4″ to 109′ 7″
24.	Soft slate, ...	4′ 6″ to 168′ 6 ′	2′ 10″ to 112′ 5″
25.	Sand rock, ...	27′ 3″ to 195′ 9″	19′ 0″ to 131′ 5″
26.	Soft slate, ...	14′ 3″ to 210′ 0″	9′ 7″ to 141′ 0′
27.	Hard slate, ...	3′ 6″ to 213′ 6″	2′ 8″ to 143′ 8″
28.	Sand rock, ...	5′ 6″ to 219′ 0″	3′ 5″ to 147′ 1″
29.	Hard slate, ...	36′ 6″ to 255′ 6′	24′ 9″ to 171′ 10″
30.	Soft slate, ...	5′ 6″ to 261′ 0″	3′ 6″ to 175′ 4″
31.	HOLMES BED. Dip 43°, ...	22′ 0″ to 283′ 0″	15′ 1″ to 190′ 5″
32.	Soft slate, ...	16′ 0″ to 299′ 0″	10′ 11″ to 201′ 4″
33.	Sand rock, ...	93′ 0″ to 392′ 0″	51′ 0″ to 252′ 4″
34.	Soft slate, ...	7′ 0″ to 399 0″	3′ 9″ to 256′ 1″
35.	MAMMOTH BED TOP SPLIT. Dip 35½°,	21′ 6″ to 420′ 6″	13′ 0″ to 269′ 1″
36.	Hard slate, ...	13′ 0″ to 433′ 6″	8′ 10″ to 277′ 11″
37.	Sand rock, ...	59′ 3″ to 492 9″	33′ 8″ to 311′ 7″
38.	Hard slate, ...	35′ 9″ to 528′ 6″	16′ 7″ to 328′ 2″
39.	Sand rock, ...	36′ 0″ to 564′ 6″	24′ 8″ to 352′ 10″
40.	MAMMOTH BED. Dip 35°, ...	35′ 6″ to 600′ 0″	27′ 7″ to 380′ 5″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
41.	Soft slate, ...	9′ 3″ to 609′ 3″	5′ 4″ to 385′ 9″
42.	Conglomerate, . . .	38′ 9″ to 648′ 0″	28′ 2″ to 413′ 11″
43.	COAL BED. Dip 37½°,	3′ 6″ to 652′ 0″	1′ 11′ to 415′ 10″
44.	Sand rock, ...	31′ 0″ to 683′ 0″	19′ 8″ to 435′ 6″
45.	Soft slate, ...	11′ 0″ to 694′ 0″	6′ 0″ to 441′ 6″
46.	COAL BED. Dip 37°,	4′ 3″ to 698′ 3″	3′ 0″ to 444′ 6″
47.	Hard slate. Dip 39°,	47′ 9″ to 746′ 0″	21′ 5″ to 465′ 11″
48.	COAL, ...	6″ to 746′ 6″	3″ to 466′ 2″
49.	Soft slate, ...	17′ 0″ to 763′ 6″	12′ 2″ to 478′ 4″
50.	Sand rock. Dip 46°,	68′ 0″ to 831′ 6″	39′ 2″ to 517′ 6″
51.	Hard slate. Dip 43°,	13′ 0″ to 844′ 6″	8′ 5′ to 525′ 11″
52.	COAL, BUCK MOUNTAIN BED. Dip 32°,	5′ 0″ to 849′ 6″	18′ 7″ to 544′ 6″
53.	Slate,	4′ 0″ to 853′ 6″	
54.	COAL,	25′ 0″ to 878′ 6″	

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Girard Mammoth colliery, Water Level tunnel.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, ...	21′ 0″ to 21′ 0″
2.	Sandstone, ...	30′ 0″ to 60′ 0″
3.	Slate, ...	3′ 6″ to 63′ 6″
4.	COAL, SKIDMORE BED, ...	3′ 0″ to 66′ 6″
5.	Slate,	8′ 2″ to 74′ 8″
6.	COAL,	5′ 0″ to 79′ 8″
7.	Slate, ...	4′ 0″ to 83′ 8″
8.	Sandstone, ...	52′ 0″ to 135′ 8″
9.	Slate, ...	1′ 7″ to 137′ 3″
10.	SEVEN-FOOT BED, ...	5′ 0″ to 142′ 3″
11.	Slate, ...	10′ 0″ to 152′ 3″
12.	Sandstone, ...	17′ 8″ to 169′ 11″
13.	Sandstone, ...	18′ 6″ to 188′ 5″
14.	Slate, ...	23′ 5″ to 211′ 10″
15.	COAL, BUCK MOUNTAIN BED, ...	5′ 0″ to 216′ 10″
16.	Slate,	2′ 7″ to 219′ 5″
17.	COAL,	17′ 4″ to 236′ 9″
18.	Slate, ...	7′ 0″ to 243′ 9″
19.	Sandstone, ...	25′ 0″ to 268′ 9″
20.	Slate, ...	8′ 0″ to 276′ 9″
21.	Sandstone, ...	23′ 2″ to 299′ 11″
22.	Conglomerate, ...	68′ 0″ to 367′ 11″
23.	Sandstone, ...	22′ 0″ to 389′ 11″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
24.	Slate,	2′ 6″ to 392′ 5″
25.	Sandstone,	40′ 0″ to 432′ 5″
26.	Sandstone,	44′ 6″ to 476′ 11″
27.	Slate,	2′ 8″ to 479′ 7″
28.	Sandstone,	37′ 0″ to 516′ 7″
29.	Conglomerate,	68′ 0″ to 584′ 7″
30.	Sandstone,	18′ 0″ to 602′ 7″
31.	Conglomerate,	62′ 0″ to 664′ 7″
32.	Slate,	4′ 0″ to 668′ 7″
33.	Conglomerate,	50′ 0″ to 718′ 7″
34.	Slate,	3′ 0′ to 721′ 7″
35.	Conglomerate,	28′ 6″ to 750′ 1″
36.	Sandstone,	30′ 0″ to 780′ 1″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Girard colliery tunnel from Holmes bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally*	*Thicknesses perpendicular to dip.*
1.	Hard slate,	37′ 0″ to 37′ 0″	34′ 0″ to 34′ 0″
2.	HOLMES BED. Dip 67° N.,	9 6″ to 46′ 6″	8′ 9″ to 42′ 9″
3.	Hard slate,	50′ 6″ to 97′ 0″	46′ 6″ to 89′ 3″
4.	COAL BED. Dip 66° N.,	4′ 0″ to 101′ 0″	3′ 6″ to 92′ 9″
5.	Soft slate,	22′ 0″ to 123′ 0″	20′ 1″ to 112′ 10″
6.	MAMMOTH BED. Dip 66° N.,	36′ 0″ to 159′ 0″	32′ 8″ to 145′ 6″
7.	Hard slate,	8′ 0″ to 167′ 0″	7′ 3″ to 152′ 9″
8.	Sandstone,	8′ 0″ to 175′ 0″	7′ 3″ to 160′ 0″
9.	Conglomerate,	3 0″ to 178′ 0″	2′ 9″ to 162′ 9″
10.	COAL, Dip 66° N.,	8″ to 178′ 8″	4″ to 163′ 1″
11.	Conglomerate,	1′ 10″ to 180′ 6″	1′ 8″ to 164′ 9″
12.	Sandstone,	6′ 6″ to 187′ 0″	5′ 11″ to 170′ 8″
13.	Conglomerate,	15′ 0″ to 202′ 0″	13′ 8″ to 184′ 4″
14.	Hard slate,	17′ 0″ to 219′ 0″	15′ 6″ to 199′ 10″
15.	SKIDMORE BED. Dip 67° N.,	4′ 6″ to 223′ 6″	4′ 0″ to 203′ 10″
16.	Soft slate,	8′ 0″ to 231′ 6″	7′ 4″ to 211′ 2″
17.	COAL. Dip 67° N.,	2′ 6″ to 234′ 0″	2′ 0″ to 213′ 2″
18.	Hard slate,	7′ 0″ to 241′ 0″	6′ 5″ to 219′ 7″
19.	Sandstone,	24′ 0″ to 265′ 0″	22′ 7″ to 242′ 2″
20.	SEVEN-FOOT BED. Dip 74° N.,	2′ 0″ to 267′ 0″	1′ 9″ to 243′ 11″

No of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
21.	Soft slate, ...	3′ 0″ to 270′ 0″	2′ 10″ to 246′ 9″
22.	Hard slate, ...	9′ 0″ to 279′ 0″	8 6″ to 255′ 3′
23.	COAL. Dip 74° N., . .	3′ 0″ to 282′ 0″	2′ 4″ to 257′ 7″
24.	Hard slate, ...	29′ 6′ to 311′ 6″	26′ 4″ to 283′ 11″
25.	COAL. Dip 73° N., . .	1′ 6″ to 313′ 0″	1′ 0″ to 284′ 11′
26.	Hard slate, ...	6″ to 313′ 6″	6′ to 285′ 5′
27.	Sandstone, ...	10′ 6″ to 324′ 0″	10′ 0″ to 295′ 5″
28.	Conglomerate, ...	10′ 0″ to 334′ 0″	9′ 6′ to 304′ 11″
29.	Sandstone, ...	26′ 0″ to 360′ 0″	24′ 8″ to 329′ 7″
30.	Hard slate. Dip 74° N.,	10′ 0″ to 370′ 0″	9′ 6″ to 339′ 1″
31.	BUCK MOUNTAIN BED.		
	Dip 68° N., ...	17′ 0″ to 387′ 0″	15′ 6″ to 354′ 7″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Girard colliery, section of Water Level tunnel, from Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	Description.	Thicknesses per perpendicular to dip.
1.	MAMMOTH BED,	—— ——
2.	Slate, ...	2′ 7″ to 2′ 7″
3.	Sandstone, ...	11′ 7″ to 14′ 2″
4.	Conglomerate, ...	43′ 6′ to 57′ 8″
5.	Hard slate, ...	9′ 6″ to 67′ 2″
6.	COAL, (COAL, slate and dirt), ...	2′ 7″ to 69′ 9″
7.	Hard slate, ...	7′ 7″ to 77′ 4″
8.	Dirt, ...	4″ to 77′ 8″
9.	Soft slate, ...	6″ to 78′ 2″
10.	COAL, soft, ...	6″ to 78′ 8′
11.	Hard slate, ...	6′ 0″ to 84′ 8′
12.	Conglomerate, ...	21′ 4″ to 106′ 0″
13.	COAL, good, hard, ...	1′ 0″ to 107′ 0″
14.	Hard slate, ...	4″ to 107′ 4′
15.	COAL, good, hard, ...	9′ to 108′ 1″
16.	Hard slate, ...	11′ 6″ to 119′ 7″
17.	Soft slate, ...	4″ to 119′ 11′
18.	COAL, good, ...	9″ to 120′ 8′
19.	Soft slate, ...	4″ to 121′ 0″
20.	Dirt, ...	5″ to 121′ 5″
21.	Hard slate, ...	22′ 0″ to 143′ 5″
22.	Sandstone, ...	11″ to 144′ 4″
23.	Hard slate, ...	2′ 8′ to 147′ 0″
24.	COAL, good, hard, ...	9″ to 147′ 9″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
25.	Hard slate,	16′ 4″ to 164′ 1″
26.	Conglomerate,	27′ 1″ to 191′ 2″
27.	Dirt,	11″ to 192′ 1″
28.	Slate,	4′ 8″ to 196′ 9″
29.	BUCK MOUNTAIN BED,	12′ 1″ to 208′ 10″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

West Bear Ridge colliery, tunnel under Mahanoy creek (North dips.)

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Soft slate,	56′ 0″ to 56′ 0″	26′ 3″ to 26′ 3″
2.	Dirt,	2″ to 56′ 2″	1″ to 26′ 4″
3.	Soft sandstone,	14′ 0″ to 70′ 2″	6′ 6″ to 32′ 10″
4.	COAL,	1′ 0″ to 71′ 2″	5″ to 33′ 3″
5.	Soft slate,	10′ 0″ to 81′ 2″	4′ 8″ to 37′ 11″
6.	HOLMES BED,	10′ 0″ to 91′ 2″	6′ 2″ to 44′ 1″
7.	Hard blue slate with iron balls,	52′ 0″ to 143′ 2″	32′ 0″ to 76′ 1″
8.	Dirt,	3″ to 143′ 5″	2″ to 76′ 3″
9.	Hard slate,	11′ 0″ to 154′ 5″	6′ 8″ to 82′ 11″
10.	Hard, fine sandstone with mica,	131′ 0″ to 285′ 5″	80′ 6″ to 163′ 5″
11.	Hard slate,	10′ 0″ to 295′ 5″	8′ 3″ to 171′ 8′
12.	Soft black slate,	5′ 0″ to 300′ 5″	4′ 1″ to 175′ 9″
13.	MAMMOTH BED,	38′ 0″ to 338′ 5″	31′ 0″ to 206′ 9″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

West Bear Ridge colliery, tunnel under Mahanoy creek (South dips).

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses measured perpendicular to dip.*
1.	Soft slate,	29′ 6″ to 29′ 6″	10′ 0″ to 10′ 0″
2.	Seam of dirt,	2″ to 29′ 8″	1″ to 10′ 1″
3.	Hard slate,	7′ 4″ to 37′ 0″	3′ 0″ to 13′ 1″
4.	Soft slate,	1′ 6″ to 38′ 6″	7″ to 13′ 8″
5.	HOLMES BED. Dip 53½°,	4′ 6″ to 43′ 0″	3′ 7″ to 17′ 3′

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
6.	Soft slate, ...	4' 9'' to 47' 9''	4' 1'' to 21' 4''
7.	Hard blue slate, with iron, ...	40' 0'' to 87' 9''	34' 7'' to 55' 11''
8.	Soft slate, ...	2' 0'' to 89' 9''	1' 8'' to 57' 7''
9.	COAL and slate. Dip 63°, ...	1' 6'' to 91' 3''	1' 4'' to 58' 11''
10.	Hard sandstone, with mica. Dip 51½°, .	79' 0'' to 170' 3''	62' 4'' to 121' 3''
11.	Hard blue slate, . . .	23' 0'' to 193' 3''	19' 0'' to 140' 3''
12.	Hard black slate, . .	26' 0'' to 219' 3''	22' 4'' to 162' 7''
13.	MAMMOTH BED.	—— ——	—— ——

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

West Bear Ridge colliery, tunnel from Mammoth to Buck Mountain bed, on upper lift of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured perpendicular to dip.*
1.	MAMMOTH BED, ...	25' 0'' to 25' 0''
2.	Slate, ...	1' 7'' to 26' 7''
3.	Sandstone, ...	5' 6'' to 32' 1''
4.	Hard slate, ...	6' 2'' to 38' 3''
5.	Sandy slate, ...	9' 2'' to 47' 5''
6.	Slate, ...	1' 7'' to 49' 0''
7.	COAL, ...	2' 0'' to 51' 0''
8.	Hard slate, ...	16' 7'' to 67' 7''
9.	COAL, ...	7'' to 68' 2''
10.	Slate, ...	3' 7'' to 71' 9''
11.	SKIDMORE BED, ...	2' 10'' to 74' 7''
12.	Hard slate, ...	25' 1'' to 99' 8''
13.	Conglomerate, ...	8' 8'' to 108' 4''
14.	SEVEN-FOOT BED, ...	3' 7'' to 111' 11''
15.	Slate, ...	5' 6'' to 117' 5''
16.	COAL, ...	1'' to 117' 6''
17.	Slate, ...	10' 0'' to 127' 6''
18.	Sandstone, ...	12' 4'' to 139' 10''
19.	COAL BED, ...	3' 4'' to 143' 2''
20.	Hard sandstone, ...	18' 8'' to 161' 10''
21.	BUCK MOUNTAIN BED, ...	14' 0'' to 175' 10''
22.	Hard slate, ...	6' 7'' to 182' 5''
23.	Sand rock, ...	4' 7'' to 187' 0''

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

West Bear Ridge colliery, tunnel from centre of basin to Buck Mountain bed (North dip).

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured hortizontally.*	*Thicknesses perpendicular to dip.*
1.	Hard slate, . . .	63′ 0″ to 63′ 0″	47′ 3″ to 47 3″
2.	HOLMES BED. Dip 48½° N., . .	9′ 6″ to 72′ 6″	7′ 9″ to 55′ 0″
3.	Hard slate, . . .	58′ 6″ to 131′ 0	43′ 10″ to 98′ 10″
4.	Sandstone, . . .	37′ 0″ to 168′ 0″	27′ 11″ to 126′ 9″
5.	Hard slate, . . .	3′ 0″ to 171′ 0″	2′ 3″ to 129′ 0″
6.	Sandstone, . . .	67′ 6″ to 238′ 6″	51′ 4″ to 180′ 4″
7.	Hard slate, . . .	8′ 0″ to 246 6″	6′ 2″ to 186′ 6″
8.	Sandstone, . . .	15′ 0″ to 261′ 6″	11′ 7″ to 198′ 1″
9.	Hard slate, . . .	19′ 6″ to 281′ 0′	15′ 0″ to 213′ 1″
10.	MAMMOTH BED. (Dip 51° N.), .	35′ 0″ to 316′ 0″	29′ 0″ to 242′ 1″
11.	Soft slate, ...	4′ 0″ to 320′ 0″	3′ 0″ to 245′ 1″
12.	Sandstone, . . .	9′ 0″ to 329′ 0″	7′ 0″ to 252′ 1″
13.	Conglomerate, .	9′ 0″ to 338′ 0″	7′ 0″ to 259′ 1″
14.	Hard slate, . . .	3′ 0″ to 341′ 0″	2′ 4″ to 261′ 5″
15.	Sandstone, . . .	15′ 0″ to 356′ 0″	11′ 8″ to 273′ 1″
16.	Hard slate, . . .	2′ 6″ to 358′ 6″	1′ 11″ to 275′ 0″
17.	COAL. Dip 52° N.,	6″ to 359′ 0″	9″ to 275′ 9″
18.	Hard slate, . . .	20′ 0″ to 379′ 0″	15′ 7″ to 291′ 4″
19.	COAL, ...	6″ to 379′ 6″	4″ to 291′ 8″
20.	Hard slate, . . .	10′ 0″ to 389′ 6″	7′ 10″ to 299′ 6′
21.	SKIDMORE BED. Dip 50° N., . .	5′ 6″ to 395′ 0″	5′ 0″ to 304′ 6′
22.	Hard slate, . . .	7 0″ to 402′ 0″	5′ 4″ to 309′ 10 ′
23.	Sandstone, . . .	16′ 6″ to 418′ 6″	13′ 0″ to 322′ 10″
24.	SEVEN FOOT BED. Dip 53° N., . .	8′ 6″ to 427 0′	6′ 10″ to 329′ 8″
25.	Soft slate, ...	3′ 0″ to 430′ 0″	2′ 5″ to 332′ 1″
26.	Hard slate, . . .	7′ 0″ to 437′ 0″	5′ 9″ to 337′ 10″
27.	COAL, ...	2′ 0″ to 439′ 0″	1′ 8″ to 339′ 6″
28.	Sandstone, . . .	63′ 0″ to 502′ 0″	53′ 7″ to 393′ 1″
29.	Conglomerate, .	9′ 0″ to 511′ 0″	7′ 10″ to 400′ 11″
30.	Sandstone, . . .	3′ 0″ to 514′ 0″	2′ 8′ to 403′ 7″
31.	BUCK MOUNTAIN Dip 64° N., . .	16′ 0″ to 530′ 0″	14′ 5″ to 418′ 0″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

East Bear Ridge colliery, Water level tunnel, from Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED.** Dip 42°, ...	38′ 9″ to 38′ 9″	26′ 0″ to 26′ 0″
2.	Soft slate, ...	1′ 3″ to 40′ 0″	9″ to 26′ 9″
3.	Sandstone, ...	8′ 6″ to 48′ 6″	6′ 0″ to 32′ 9″
4.	Hard slate, ...	7′ 6″ to 56′ 0″	5′ 0″ to 37′ 9″
5.	Sandstone, ...	15′ 0″ to 71′ 0″	10′ 0″ to 47′ 9″
6.	Soft slate, ...	1′ 0″ to 72′ 0″	8″ to 48′ 5″
7.	COAL. Dip 38°, . .	2 0′ to 74′ 0″	1′ 8″ to 50′ 1″
8.	Sandstone, ...	9′ 0 ′ to 83′ 0″	5′ 2″ to 55′ 3″
9.	Hard slate, ...	16′ 0″ to 99′ 0″	11′ 0″ to 66′ 3″
10.	COAL, ...	1′ 0″ to 100′ 0″	6″ to 66′ 9″
11.	Soft slate, ...	6 0″ to 106′ 0″	4′ 3″ to 71′ 0″
12.	COAL. Dip 47°, . .	5′ 6″ to 111′ 6″	3′ 8″ to 74′ 8″
13.	Soft slate, ...	1′ 0″ to 112′ 6″	8″ to 75′ 4″
14.	Sandstone, ...	29′ 6″ to 142′ 0″	26′ 0″ to 101′ 4″
15.	Soft slate, ...	2′ 0″ to 144′ 0″	1′ 10″ to 103′ 2″
16.	Fine conglomerate, .	17′ 0″ to 161′ 0″	15′ 0″ to 118′ 2″
17.	COAL BED. Dip 59°,	5′ 0″ to 166′ 0″	3′ 10″ to 122′ 0″
18.	Hard slate, ...	8′ 0″ to 174′ 0″	3′ 6″ to 125′ 6″
19.	COAL, ...	6″ to 174′ 6″	3″ to 125 9″
20.	Hard slate, ...	37′ 6″ to 212′ 0″	10′ 6″ to 136′ 3″
21.	COAL, ...	8′ 6″ to 220′ 6″	1′ 6″ to 137′ 9″
22.	Sandstone, ...	23′ 0″ to 243′ 6″	16′ 6″ to 154′ 3″
23.	Soft slate, ...	1′ 6″ to 245′ 0″	8″ to 154′ 11″
24.	COAL. Dip 45°, . . .	2′ 0″ to 247′ 0″	2′ 0″ to 156′ 11″
25.	Hard gray sandstone,	12′ 6″ to 259′ 6″	6′ 6″ to 163′ 5″
26.	COAL. Dip 39°, . . .	4′ 6″ to 264′ 0″	2′ 9″ to 166′ 2″
27.	Hard slate, ...	4′ 0″ to 268′ 0″	2′ 4″ to 168′ 6″
28.	Sandstone, ...	7′ 0″ to 275′ 0″	4′ 6″ to 173′ 0″
29.	Fine conglomerate, .	31′ 0″ to 306′ 0″	20′ 6″ to 193′ 6″
30.	Slate. Dip 40°, . . .	47′ 0″ to 353′ 0″	22′ 0″ to 215′ 6″
31.	BUCK MOUNTAIN BED, ...	17′ 6′ to 370′ 6″	8′ 6″ to 224′ 0″
32.	Slate. Dip 27°, . . .	3′ 6″ to 374′ 0″	1′ 10″ to 225′ 10″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlases Western Middle Anthracite Field, Parts I and II.

Lawrence colliery, tunnel from Mammoth to Buck Mountain bed on 1st lift of slope.

Lawrence & Brown.

No. of strata.	*Description.*			*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED,		Dip 58° North.	47' 0'' to 47' 0''	39' 10'' to 39' 10''
2.	Slate, ...			24' 0'' to 71' 0''	20' 4'' to 60' 2'
3.	COAL, ...			3' 0'' to 74' 0''	2' 6'' to 62' 8''
4.	Sandstone, . . .			17' 0'' to 91' 0''	14' 5'' to 77' 1''
5.	COAL,	SKIDMORE BED.		1' 9'' to 92' 9''	1' 6'' to 78' 7''
6.	Slate,			5 3' to 98' 0''	4' 6'' to 83' 1''
7.	COAL,			8' 0'' to 106' 0''	6' 9'' to 89' 10''
8.	Slate, ...			6' 3'' to 112' 3''	5' 4'' to 95' 2''
9.	Sandstone, . . .			13' 1'' to 125' 4''	11' 1'' to 106' 3''
10.	COAL, ...			8'' to 126' 0''	6'' to 106' 9'
11.	Sandstone, . . .			47' 2'' to 173' 2''	40' 0'' to 146' 9''
12.	COAL,	SEVEN-FOOT BED.		1' 5'' to 174' 7''	1' 2'' to 147' 11''
13.	Slate,			1' 10'' to 176' 5''	1' 6'' to 149' 5''
14.	COAL,			2' 7'' to 179' 0''	2' 2'' to 151' 7''
15.	Sandstone,			67' 6'' to 246' 6''	57' 3' to 208' 10''
16.	Slate, ...			2' 0'' to 248' 6''	1' 8'' to 210' 6''
17.	BUCK MOUNTAIN BED, . .			11' 6'' to 260' 0''	9' 9'' to 220' 3''
18.	Slate and dirt, .			5' 4'' to 265' 4''	4' 6'' to 224' 9''

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlases Western Middle Anthracite Field, Parts I and II.

Lawrence colliery, cross-cut from Mammoth to Skidmore bed in breast No. 4, 1st lift of slope.

Lawrence & Brown.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, ...	37' 3'' to 37' 3''	31' 4'' to 31' 4''
2.	Hard sandstone, ...	30' 9'' to 68' 0''	25' 9'' to 57' 1''
3.	COAL, ...	2' 6'' to 70' 6''	2' 1'' to 59' 2''
4.	Hard sandstone, ...	25' 6' to 96' 0''	21' 6' to 80' 8''
5.	SKIDMORE BED, ...	10' 6'' to 106' 6''	8' 10'' to 89' 6''

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlases Western Middle Anthracite Field, Parts I and II.

Stanton colliery, tunnel from Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED,	35′ 0″ to 35′ 0″
2.	Fine black slate,	21′ 6″ to 56′ 6″
3.	COAL,	1′ 8″ to 58′ 2″
4.	Hard slate,	15′ 5″ to 73′ 7″
5.	COAL,	8″ to 74′ 7″
6.	Free slate,	2′ 4″ to 76′ 7″
7.	SKIDMORE BED,	4′ 6″ to 81′ 1″
8.	Slate,	22′ 3″ to 103′ 4″
9.	COAL,	1′ 5″ to 104′ 9″
10.	Slate,	12′ 6″ to 117′ 3″
11.	Dirt and soft slate,	5″ to 117′ 8″
12.	Hard slate,	2′ 4″ to 120′ 0″
13.	Sand rock,	9′ 6″ to 129′ 6″
14.	SEVEN-FOOT BED,	4′ 4″ to 133′ 10″
15.	Conglomerate,	36′ 0″ to 169′ 10″
16.	Hard slate,	16′ 5″ to 186′ 3″
17.	BUCK MOUNTAIN BED,	10 0″ to 196′ 3″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Stanton colliery, tunnel on 2nd lift of slope from Mammoth to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED.	Dip 64½° North.	—— ——	—— ——
2.	Strata,		24′ 0″ to 24′ 0″	22′ 0″ to 22′ 0″
3.	COAL,		2′ 0″ to 26′ 0′	2′ 0″ to 24′ 0″
4.	Strata,		19′ 0″ to 45′ 0″	16′ 0″ to 40′ 0″
5.	SKIDMORE BED,		5′ 0″ to 50′ 0″	5′ 0″ to 45′ 0″
6.	Strata,		60′ 0″ to 110′ 0″	54′ 0″ to 99 0″
7.	SEVEN-FOOT BED,		5′ 0″ to 115′ 0″	5′ 0″ to 104′ 0″
8.	Strata,		56′ 6″ to 171′ 6″	50′ 0″ to 154′ 0″
9.	BUCK MOUNTAIN BED,		12′ 6″ to 183′ 0″	10′ 5″ to 164′ 5″

See Columnar Section Sheet No. IV and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Packer colliery No. 5, tunnel at foot of shaft.

Lehigh Valley Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	COAL and dirt. Dip 61° N., ...	1′ 4′ to 1′ 4″	1′ 2″ to 1′ 2′
2.	Slate, ...	5′ 0″ to 6′ 4″	4′ 5″ to 5′ 7″
3.	Sandstone, ...	35′ 0″ to 41′ 4″	30′ 7″ to 36′ 2″
4.	Slate, ...	2′ 7″ to 43′ 11″	2′ 3″ to 38′ 5″
5.	Sandstone and slate,	10′ 0″ to 53′ 11″	8′ 9″ to 47′ 2″
6.	Slate, ...	5′ 4″ to 59′ 3″	4′ 8″ to 51′ 10″
7.	Sandstone, ...	5′ 2″ to 65′ 5″	4′ 7″ to 56′ 5″
8.	Slate, ...	3′ 2″ to 67′ 7′	2′ 8′ to 59′ 1″
9.	Sandstone, ...	29′ 0″ to 96′ 7″	25′ 4″ to 84′ 5″
10.	COAL and refuse. Dip 62°.	2′ 5″ to 99′ 0″	2′ 2″ to 86′ 7″
11.	Hard black slate, . .	19′ 0″ to 118′ 0″	16′ 9″ to 103′ 4″
12.	Sandstone, ...	6′ 0′ to 124′ 0″	5′ 4″ to 108′ 8″
13.	Slate, ...	1′ 2″ to 125′ 2″	11″ to 109′ 7″
14.	Sandstone, ...	21′ 11″ to 147′ 1″	19′ 4″ to 128′ 11″
15.	COAL and slate, . . .	4″ to 147′ 5″	3″ to 129′ 2″
16.	Sandstone, ...	1′ 5″ to 148′ 10′	1′ 3″ to 130′ 5″
17.	COAL BED. Dip 61°, .	7′ 7′ to 156′ 5″	6′ 4″ to 136′ 9′
18.	Slate and sandstone, .	51′ 6″ to 207′ 11″	45′ 1″ to 181′ 10″
19.	COAL. Dip 65°, . . .	6″ to 208′ 5″	6″ to 182′ 4″
20.	Slate, ...	12′ 6″ to 220 11″	11′ 4″ to 193′ 8″
21.	Sandstone, ...	5′ 0″ to 225′ 11″	4′ 6″ to 198′ 2″
22.	Conglomerate, ...	37′ 0″ to 262′ 11″	33′ 6″ to 231′ 8″
23.	Sand rock, ...	9′ 8″ to 272′ 7″	8′ 10″ to 240′ 6″
24.	COAL BED. Dip 70° .	6′ 5″ to 279′ 0″	6′ 0″ to 246′ 6″
25.	Sandrock, ...	27′ 7″ to 306′ 7″	25′ 10″ to 272′ 4″
26.	Fine hard gray rock,	47′ 9″ to 354′ 4″	44′ 10″ to 317′ 2″
27.	COAL. Dip 71°, . . .	8′ 9″ to 361′ 1″	8′ 3″ to 325′ 5″
28.	Soft black slate, . . .	2′ 5″ to 365′ 6″	2′ 3″ to 327′ 8″
29.	Slaty sandstone, . . .	40′ 6″ to 406′ 0″	38′ 6″ to 366′ 2″
30.	SS. with streaks of slate,	40′ 6″ to 446′ 6″	38′ 6″ to 404′ 8″
31.	Sandstone with streaks of quartz, ...	5′ 0″ to 451′ 6″	4′ 9″ to 409′ 5″
32.	Soft, broken slate, . .	4′ 6″ to 456′ 0″	4′ 4″ to 413′ 9″
33.	COAL. Dip. 65°, . . .	1′ 6″ to 457′ 6″	1′ 5″ to 415′ 2″
34.	Soft black slate like fire clay, ...	4′ 2″ to 461′ 8″	3′ 8″ to 418′ 10″
35.	COAL BED. Dip 59°, .	4′ 9″ to 466′ 5″	4′ 2″ to 423′ 0″
36.	Sandy slate, ...	3 1″ to 469′ 6″	2′ 7″ to 425′ 7″
37.	Hard gray sandstone,	10′ 0″ to 479′ 6″	8′ 6″ to 434′ 1″
38.	Hard gray sandstone,	10′ 6″ to 490′ 0″	9′ 0″ to 443′ 1″
39.	Hard gray SS. with cong., ...	9′ 6″ to 499′ 6″	8′ 2″ to 451′ 3″
40.	Black slate, ...	6′ 3″ to 505′ 9″	5′ 5″ to 456′ 8′

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
41.	Coal and slate,	2″ to 505″ 11″	2″ to 456′ 10″
42.	Slate,	3′ 6″ to 509′ 5″	3′ 2″ to 460′ 0″
43.	Coal bed,	2′ 10″ to 512′ 8″	2′ 9′ to 462′ 9″
44.	Slaty sandstone,	29′ 0″ to 541′ 3″	24′ 11″ to 487′ 8″
45.	Sandy slate,	3′ 0″ to 544′ 3″	2′ 7″ to 490′ 3″
46.	Sandstone,	7′ 0″ to 551′ 3″	6′ 0″ to 496′ 3″
47.	Sand slate,	3′ 0″ to 554′ 3″	2′ 7′ to 498′ 10″
48.	Sandstone,	3′ 0′ to 557′ 3″	2′ 7″ to 501′ 5″
49.	Sandy slate with iron ore balls,	5′ 0″ to 562′ 3″	4′ 3″ to 505′ 8″
50.	Sandstone,	1′ 0″ to 563′ 3″	10″ to 506′ 6″
51.	Sand slate,	10′ 6″ to 573′ 9″	9′ 5″ to 515′ 11″
52.	Sandstone,	2′ 0″ to 575′ 9″	1′ 8″ to 517′ 7′
53.	Sand slate,	4′ 0″ to 579′ 9″	3′ 5″ to 521′ 0″
54.	Sandstone,	6′ 6′ to 586′ 3″	5′ 7″ to 526′ 7″
55.	Sand slate,	8′ 0″ to 594′ 3″	6′ 10″ to 533′ 5″
56.	Sand slate,	11′ 6″ to 605′ 9″	9′ 10″ to 543′ 3″
57.	Black slate,	13′ 6″ to 619′ 3″	11′ 7″ to 554′ 10″
58.	Coal, } Holmes bed. Dip 62°,	11′ 0″ to 630′ 3″	4′ 9″ to 559′ 7″
59.	Slate,		2′ 0′ to 561′ 7″
60.	Coal,		2′ 9″ to 564′ 4″
61.	Black slate,	28′ 0″ to 658′ 3″	24′ 8″ to 589′ 0″
62.	Coal. Dip 60°,	1′ 0″ to 659′ 3″	1′ 0″ to 590′ 0″
63.	Sand rock,	25′ 10″ to 685′ 1″	22′ 4″ to 612′ 4″
64.	Slate and sandstone,	1′ 6″ to 686′ 7″	1′ 4″ to 613′ 8″
65.	Sand rock,	29′ 0″ to 715′ 7″	25′ 1″ to 638′ 9″
66,	Sandstone and slate,	17′ 10″ to 733′ 5″	14′ 8″ to 653′ 5″
67.	Sandstone,	6′ 6″ to 739′ 11″	5′ 4″ to 658′ 9″
68.	Slate,	23′ 8″ to 763′ 7″	19′ 5″ to 678′ 2″
69.	Mammoth bed. Dip 55°,	40′ 6″ to 804′ 1″	33′ 10″ to 712′ 0″
70.	Slate and sandstone,	1′ 10″ to 805′ 11″	1′ 6″ to 713′ 6″
71.	Hard sandstone,	17′ 10″ to 823′ 9″	14′ 7″ to 728′ 1″
72.	Gray SS. and cong.,	16′ 11″ to 840′ 8″	13′ 10″ to 741′ 11″
73.	Sandstone,	8′ 5″ to 849′ 1″	6′ 11″ to 748′ 10″
74.	Slate,	1′ 3″ to 850′ 4″	1′ 1′ to 749′ 11″
75.	Coal,	2′ 0″ to 852′ 4″	1′ 7″ to 751′ 6″
76.	Slate,	1′ 0″ to 853′ 4″	10″ to 752′ 4″
77.	Sand slate,	3′ 2″ to 856′ 6″	1′ 9″ to 754′ 1″
78.	Slate,	3′ 11″ to 860′ 5″	3′ 2″ to 757′ 3″
79.	Hard sand slate,	13′ 7″ to 814′ 0″	10′ 11″ to 768′ 2″
80.	Coal,	10″ to 874′ 10″	8″ to 768′ 10″
81.	Sand slate,	3′ 1″ to 877′ 11″	2′ 6″ to 771′ 4″
82.	Hard slate,	6′ 11″ to 884′ 10″	5′ 8″ to 777′ 0″
83.	Slate,	2′ 10″ to 887′ 8″	2′ 4″ to 779′ 4″
84.	Soft coal,	1′ 3″ to 888′ 11″	1′ 1″ to 780′ 5″
85.	Slate,	6′ 10″ to 895′ 9″	5′ 7′ to 786′ 0″
86.	Hard sand slate,	1′ 4″ to 897′ 1″	1′ 2″ to 787′ 2″
87.	Free slate,	8′ 3″ to 905′ 4″	6′ 9″ to 793′ 11″
88.	Hard gray rock,	20′ 10″ to 926′ 2″	17′ 1″ to 811′ 0″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
89.	Slate, ...	2′ 0″ to 928′ 2″	1′ 7″ to 812′ 7″
90.	SEVEN-FOOT BED, . .	8′ 10″ to 937′ 0″	7′ 1″ to 818′ 8″
91.	Slate, ...	4′ 9″ to 941′ 9″	4′ 0″ to 823′ 8″
92.	Slate, COAL and refuse,	6″ to 942′ 3′	6″ to 824 2″
93.	Free slate, ...	1′ 3″ to 943′ 6″	1′ 1″ to 825′ 3″
94.	Hard gray sand rock,	23′ 10″ to 967′ 4″	19′ 1″ to 844′ 4″
95.	Slate, ...	2″ to 967′ 6″	2″ to 844′ 6″
96.	Gray rock, ...	9′ 5″ to 976′ 11″	7′ 6″ to 852′ 0″
97.	Slate, ...	1′ 0″ to 977′ 11″	10″ to 852′ 10″
98.	Slate, COAL and refuse,	4″ to 978′ 3″	3″ to 853′ 1″
99.	COAL, ...	2′ 2′ to 980′ 5″	1′ 9″ to 854′ 10′
100.	Sand slate, ...	2′ 9″ to 983′ 2′	2′ 3″ to 857′ 1″
101.	Hard slate, ...	3′ 5″ to 986′ 7″	2′ 8″ to 859′ 9″
102.	Fine conglomerate, .	11′ 11″ to 998′ 6″	9′ 6″ to 869′ 3″
103.	Hard sand slate, . . .	3″ to 998′ 9″	3″ to 869′ 6″
104.	Conglomerate, ...	23′ 9″ to 922′ 6″	19′ 0″ to 888′ 6″
105.	Sandstone, ...	3′ 8″ to 926′ 2′	2′ 11″ to 891′ 5″
106.	Slate, ...	5″ to 926′ 7″	3″ to 891′ 8″
107.	Sandstone, ...	2′ 3″ to 928′ 10′	1′ 10″ to 893′ 6″
108.	BUCK MOUNTAIN BED,	15′ 0″ to 943′ 10″	12′ 0″ to 905′ 6″

* See Columnar Section Sheet No. V and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Packer colliery No. 1 tunnel, from surface to Buck Mountain bed.

Lehigh Valley Coal Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Soft sandstone, ...	18′ 9″ to 18′ 9″
2.	Soft slate, ...	5′ 7″ to 24′ 4″
3.	COAL, bony, ...	11″ to 25′ 3″
4.	Slate, ...	11″ to 26′ 2′
5.	Sandstone, ...	44′ 2″ to 70′ 4′
6.	Slate, ...	1′ 5″ to 71′ 9″
7.	COAL, ...	6″ to 72′ 3″
8.	Soft slate, ...	2′ 10′ to 75′ 1″
9.	COAL BED, ...	4′ 2″ to 79′ 3″
10.	Sandstone, ...	3′ 9″ to 83′ 0″
11.	Clay, ...	6′ to 83′ 6″
12.	Blue sandy slate with iron balls, ...	12′ 1″ to 95′ 7″
13.	Slate, ...	1′ 10′ to 97′ 5″
14.	Sandstone, ...	2′ 9″ to 100′ 2″
15.	Clay, ...	3″ to 100′ 5″
16.	Hard slate, ...	3′ 10″ to 104′ 3″
17.	Sandstone, ...	4′ 5″ to 108′ 8″

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
18.	Clay,		1″ to 108′. 9″
19.	Slate mixed with sandstone,		19′ 6″ to 128′ 3″
20.	Clay,		2″ to 128′ 5″
21.	Sandstone,		25′ 0″ to 153′ 5″
22.	Soft sondstone,		11′ 1″ to 164′ 6′
23.	Slate,		13′ 11″ to 178′ 5″
24.	COAL,	HOLMES BED.	9′ 3″ to 187′ 8″
25.	Soft slate		5′ 1″ to 192′ 9′
26.	COAL,		5′ 5″ to 198′ 2″
27.	Slate,		13′ 2″ to 211′ 4″
28.	Sandstone,		25′ 4′· to 236′ 8″
29.	Clay,		6″ to 237′ 2″
30.	Hard sandstone,		41· 10″ to 279′ 0″
31.	Sandstone,		39′ 2″ to 318′ 2″
32.	Slate,		6′ 2″ to 324′ 4″
33.	COAL,	MAMMOTH BED.	18′ 8″ to 343′ 0″
34.	Slate,		3′ 7 ′ to 346′ 7″
35.	COAL,		19′ 7″ to 366′ 2″
36.	Hard black slate,		1′ 10″ to 368′ 0″
37.	Micaceous sandstone,		29′ 1″ to 397′ 1″
38.	Dark slate,		2′ 8′ to 399′ 9 ′
39.	COAL,		1′ 4″ to 401′ 1″
40.	Soft black slate,		6′ 5″ to 407′ 6″
41.	COAL BED,		5′ 6″ to 413′ 0″
42.	Light coarse slate,		6′ 4″ to 419′ 4″
43.	Black slate,		2′ 8″ to 422′ 0″
44.	COAL,		1′ 10″ to 423′ 10″
45.	Black slate,		9′ 1″ to 432′ 11″
46.	Sandstone,		8′ 2″ to 441′ 1″
47.	Soft dark slate,		1′ 9″ to 442′ 10″
48.	Sandstone,		1′ 10 ′ to 444′ 8″
49.	Soft black slate,		11″ to 445′ 7″
50.	Sandstone,		6′ 4″ to 451′ 11″
51.	COAL BED,		6′ 4 ′ to 458′ 3″
52.	Hard slate,		3′ 7″ to 461′ 10″
53.	Sandstone,		28′ 2″ to 490′ 0″
54.	Hard black slate,		11″ to 490′ 11″
55.	COAL and refuse,		9″ to 491′ 8″
56.	Black slate,		11′ 10″ to 503′ 6″
57.	Conglomerate,		35′ 6″ to 539 0″
58.	BUCK MOUNTAIN BED,		7· 4″ to 546′ 4″

See Columnar Section Sheet No. V and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Packer colliery No. 2, tunnel from Holmes bed to Mammoth bed, on 4th lift of slope.

Lehigh Valley Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	HOLMES BED,	20′ 4″ to 20′ 4″	13′ 7″ to 13′ 7″
2.	Soft black slate,	8′ 3′ to 28′ 7″	5′ 7″ to 19′ 2″
3.	Whitish-gray SS.,	23′ 1″ to 51′ 8″	15′ 9″ to 34′ 11″
4.	Fine gray sandstone,	82′ 2″ to 133′ 10″	57′ 1″ to 92′ 0′
5.	Hard black slate,	7′ 6″ to 141′ 4″	5′ 3″ to 97′ 3″
6.	MAMMOTH BED (top split),		14′ 0″ to 111′ 3″
7.	Slate,		95′ 0″ to 206 3″
8.	MAMMOTH BED (bottom split),		23′ 0″ to 229′ 3″

See Columnar Section Sheet No. V and Mine Sheet No. III, Atlas Western Middle Anthracite Field. Parts I and II.

Packer colliery No. 4 tunnel, from Holmes bed to Mammoth bed, 1st lift of slope.

Lehigh Valley Coal Co.

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
1.	HOLMES BED,		9′ 10″ to 9′ 10″
2.	Slate,		15′ 0″ to 24′ 10″
3.	Hard sandstone,		5′ 0″ to 29′ 10″
4.	Soft black slate,		11′ 6″ to 41′ 4″
5.	Hard sandrock,		20′ 4″ to 61′ 8″
6.	Soft slate,		18′ 6″ to 80′ 2″
7.	Hard sandrock,		3′ 9″ to 83′ 11″
8.	Hard dark slate,		9′ 8″ to 93′ 7″
9.	White sandstone,		1′ 2″ to 94′ 9″
10.	Soft black slate,		7″ to 95′ 4″
11.	Top slate,		1′ 9″ to 97′ 1″
12.	COAL,		7′ 0″ to 104′ 1″
13.	Free black slate and iron ore balls,		22′ 0″ to 126′ 1″
14.	COAL,		5″ to 126 5″
15.	Soft black slate,		62′ 0″ to 188′ 6″
16.	COAL,	MAMMOTH BED.	18′ 0″ to 206′ 6″
17.	Slate,		2′ 6″ to 209′ 0″
18.	COAL,		28′ 0″ to 237′ 0″

See Columnar Section Sheet No. V and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Packer colliery No. 2, tunnel from the Holmes bed to the Mammoth bed, on the 2d lift of slope.

Lehigh Valley Coal Company.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	HOLMES BED. Dip 33°,	27' 9" to 27' 9"	15' 1" to 15' 1"
2.	Soft black slate, . . .	9' 0" to 36' 9"	4' 10" to 19' 11"
3.	Fine, hard, white SS.,	19' 0" to 55' 9"	10' 4" to 30' 3"
4.	Fine, hard gray rock,	173' 3" to 229' 0"	96' 10" to 127' 1"
5.	Hard black slate, . .	1' 3" to 230' 3"	8" to 127' 9"
6.	Hard white sandstone,	12' 3" to 242' 6"	6' 11" to 134' 8"
7.	Black laminated slate,	20' 3" to 262' 9"	11' 5" to 146' 1"
8.	MAMMOTH BED, . . .	——— ———	36' 0" to 182' 1"

See Columnar Section Sheet No. V and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Packer No. 4 colliery, tunnel from Holmes bed to Buck Mountain bed, 2d lift of slope.

Lehigh Valley Coal Company.

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
1.	HOLMES BED, ...		8' 3" to 8' 3"
2.	Slate, ...		16' 0" to 24' 3"
3.	Hard sandstone, ...		4' 6" to 28' 9"
4.	Soft black slate, ...		11' 0" to 39' 9'
5.	Hard sand rock, ...		19' 6" to 59' 3'
6.	Slate with iron ore balls, ...		20' 0" to 79' 3
7.	Hard slate, ...		3' 6" to 82' 9
8.	Hard sand rock, ...		8' 6" to 91' 3"
9.	White sandstone, ...		1' 6" to 92' 9'
10.	Black slate, ...		1' 6" to 94' 3'
11.	FOUR-FOOT BED, ...		4' 0" to 98' 3
12.	Free slate with iron ore balls, ...		27' 0" to 125' 3
13.	COAL, ...		5" to 125' 8'
14.	Soft slate, ...		39' 0" to 164' 8'
15.	Hard black slate, ...		5' 0" to 169' 8
16.	Free slate, ...		25' 0" to 194' 8
17.	MAMMOTH BED, ...		42' 4" to 237' 0
18.	Hard slate, ...		15' 0" to 252' 0
19.	Rough hard COAL,	SKIDMORE BED.	1' 11" to 253' 11"
20.	Free slate, ...		6' 6" to 260' 5'
21.	COAL, very hard,		9" to 261' 2"
22.	Hard slate, ...		1' 3" to 262' 5"
23.	COAL, ...		1' 9" to 264' 2"

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
24.	Hard slate,	13′ 0″ to 277′ 2″
25.	Hard rock,	5′ 6″ to 282′ 8″
26.	Conglomerate,	33′ 6″ to 316′ 2″
27.	Seven-foot bed,	3′ 0″ to 319′ 2″
28.	Slate,	16′ 0″ to 335′ 2″
29.	Sandstone,	35′ 0″ to 370′ 2″
30.	Conglomerate,	13′ 0″ to 383′ 2″
31.	Slate,	11′ 6″ to 394′ 8″
32.	Buck Mountain bed,	8′ 11″ to 403′ 7″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Packer colliery No. 3, tunnel from Mammoth to Buck Mountain bed, on 4th lift of slope.

Lehigh Valley Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Mammoth bed. Dip 20°,	—— ——	—— ——
2.	Hard black slate with iron balls,	39′ 2″ to 39′ 2″	13′ 5″ to 13′ 5″
3.	Coal,	10″ to 40′ 0″	4″ to 13′ 9″
4.	Slate,	9′ 0″ to 49′ 0″	3′ 1″ to 16′ 10″
5.	Coal. Dip 21°,	7′ 5″ to 66′ 6″	2′ 8″ to 19′ 6′
6.	Hard gray slate with iron balls,	29′ 7″ to 86′ 0″	10′ 7″ to 30′ 1″
7.	Gray SS. hard,	84′ 0″ to 170′ 0″	30′ 1″ to 60′ 2″
8.	Seven-foot bed. Dip 20°,	29′ 8″ to 199′ 8″	10′ 2″ to 70′ 4″
9.	Hard black slate,	15′ 0″ to 214′ 8″	5′ 2″ to 75′ 6″
10.	Fine hard gray rock,	86′ 4″ to 301′ 0″	29′ 6″ to 105′ 0″
11.	Fine cong.,	16′ 0 ′ to 317′ 0″	5′ 6″ to 110′ 6″
12.	Coarse cong.,	10′ 7″ to 327′ 7″	4′ 0″ to 114′ 6″
13.	Soft dark slate,	30′ 3″ to 357′ 10″	12′ 4″ to 126′ 10″
14.	Buck Mountain bed. Dip 24°.	—— ——	—— ——

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Packer colliery No. 3, tunnel from Mammoth to Buck Mountain bed, on 2d lift of slope.

Lehigh Valley Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 27°.	—— ——	—— ——
2.	Soft black slate, . .	6″ to 6″	3″ to 3″
3.	Hard black slate and iron ore balls,	56′ 0″ to 56′ 6″	25′ 5″ to 25′ 8″
4.	COAL. Dip 27°, . .	6″ to 57′ 0″	3″ to 25′ 11″
5.	Soft black slate, . .	5′ 6″ to 62′ 6″	2′ 6″ to 28′ 5″
6.	SKIDMORE BED. Dip 26½°, ...	6′ 0″ to 68′ 6″	2′ 8″ to 31′ 1″
7.	Hard gray slate, .	40′ 0″ to 108′ 6″	17′ 10″ to 48′ 11″
8.	Hard gray micaceous sandstone,	56′ 6″ to 165′ 0″	23′ 10″ to 72′ 9″
9.	SEVEN-FOOT BED. Dip 24°, ...	24′ 8″ to 189′ 8′	10′ 1″ to 82′ 10″
10.	Soft black slate, . .	11′ 4″ to 201′ 0″	4′ 7″ to 87′ 5″
11.	Hard gray slate, . .	6′ 0″ to 207′ 0″	2′ 6″ to 89′ 11″
12.	Hard coarse sandstone. Dip 28°,	15′ 6″ to 222′ 6″	7′ 3″ to 97′ 2″
13.	Conglomerate, . .	72′ 6″ to 295′ 0′	34′ 0″ to 131′ 2″
14.	Soft black slate, . .	12′ 7″ to 307′ 7″	5′ 11″ to 137′ 1″
15.	Slate, ...	2′ 5″ to 310′ 0″	1′ 2″ to 138′ 3″
16.	BUCK MOUNTAIN BED, ...	26′ 10″ to 336′ 10″	12″ 7′ to 150′ 10″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

William Penn colliery, general section.

William Penn Coal Co.

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
1.	COAL, ...	PRIMROSE BED.	7′ 8″ to 7 8″
2.	Slate, ...		4′ 2″ to 11′ 10″
3.	COAL, ...		2′ 6″ to 14′ 4″
4.	Slate, hard, ...		29′ 10″ to 44′ 2″
5.	Sandstone, micaceous, ...		22′ 10″ to 67′ 0″
6.	Black slate, hard, ...		5″ to 67′ 5″
7.	Sandstone, ...		21′ 6″ to 88′ 11″
8.	HOLMES BED, ...		7′ 0″ to 95′ 11″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
9.	Black slate,	4′ 1″ to 100′ 0″
10.	Slate, hard,	4′ 10″ to 104′ 10″
11.	Fine sandstone,	43′ 8″ to 148′ 6″
12.	Free black slate with iron ore balls,	9′ 8″ to 158′ 2″
13.	**FOUR-FOOT BED,**	4′ 4″ to 162′ 6″
14.	Blue slate, soft,	37′ 2″ to 199′ 8″
15.	**COAL** and slate,	5″ to 200′ 1″
16.	Black slate, free,	99′ 6″ to 299′ 7″
17.	**MAMMOTH BED,**	34′ 6″ to 334′ 1″
18.	Slate,	10′ 7″ to 344′ 8″
19.	**COAL BED,**	5′ 0″ to 349′ 8″
20.	Slate and iron pyrites,	11′ 9″ to 361′ 6″
21.	Sandstone,	6′ 10″ to 368′ 3″
22.	Conglomerate,	1′ 11″ to 370′ 2″
23.	**COAL,**	4″ to 370′ 6″
24.	Brittle slate,	7′ 6″ to 378′ 0″
25.	Slate, hard,	8′ 0″ to 386′ 0″
26.	Sandstone,	12′ 1″ to 398′ 1″
27.	Slate and sandstone,	2′ 6″ to 400′ 7″
28.	Sandstone,	16′ 0″ to 416′ 7″
29.	Conglomerate,	29′ 6″ to 446′ 1″
30.	**COAL,**	1″ to 446′ 2″
31.	Slate,	4′ 9″ to 450′ 11″
32.	**BUCK MOUNTAIN BED?**	10′ 6″ to 461′ 5″

See Columnar Section Sheet No. V, Mine Sheet No. III, Atlas Western Middle Coal Field, Parts I and II.

West Shenandoah colliery, tunnel from Mammoth to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED,**	—— ——	—— ——
2.	Slate,	15′ 0′ to 15′ 0″	7′ 11″ to 7′ 11″
3.	Sandstone,	1′ 4″ to 16′ 4″	8″ to 8′ 7″
4.	Slate with iron ore balls,	10′ 6″ to 26′ 10″	5′ 5″ to 14′ 0″
5.	**SKIDMORE BED,**	12′ 0″ to 38′ 10″	6′ 4″ to 20′ 4″
6.	Hard Slate,	8′ 6″ to 47′ 4″	4′ 6″ to 24′ 10″
7.	Sandstone,	2′ 0″ to 49′ 4″	10″ to 25′ 8″
8.	Slate,	2′ 0″ to 51′ 4″	10″ to 26′ 6″
9.	Fine conglomerate,	11′ 6″ to 62′ 10″	4′ 9″ to 31′ 3″
10.	Sandstone,	8′ 6″ to 71′ 4″	3′ 5″ to 34 8″
11.	Slate,	33′ 0″ to 104′ 4″	13′ 11″ to 48′ 7″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
12.	Conglomerate, . .	41' 0" to 145' 4"	17' 4" to 65' 11"
13.	Slate, ...	3' 6" to 148' 10"	1' 2" to 67' 1"
14.	SEVEN-FOOT BED, .	26' 0" to 174' 10"	9' 1" to 76' 2"
15.	Hard slate, ...	8' 0" to 182' 10"	3' 3" to 79' 5"
16.	Conglomerate, . .	129' 0" to 311' 10"	54' 6" to 133' 11"
17.	COAL, ...	8" to 312' 6"	4" to 134' 3"
18.	Slate, ...	28' 0" to 340' 6"	10' 0" to 144' 3"
19.	BUCK MOUNTAIN BED, ...	23' 9" to 364' 3"	8' 6" to 152' 9"

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

West Shenandoah colliery, tunnel from Mammoth bed to conglomerate.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, ...	43' 7" to 43' 7"
2.	Slate, ...	12' 7" to 56' 2"
3.	SKIDMORE BED, ...	5' 10" to 62' 0"
4.	Slate, ...	2' 0" to 64' 0"
5.	Sandstone, ...	3' 5" to 67' 5"
6.	Sandstone, ...	10' 7" to 78' 0"
7.	Slate, ...	4' 10" to 82' 10"
8.	Black band, ...	2' 0" to 84' 10"
9.	Slate, ...	4' 10" to 89' 8"
10.	Hard rock, ...	31' 6" to 121' 2"
11.	SEVEN-FOOT BED, ...	9' 9" to 130' 11"
12.	Slate, ...	3' 5" to 134' 4"
13.	Sandstone, ...	3' 0" to 137' 4"
14.	Rock, ...	30' 1" to 167' 5"
15.	Conglomerate, ...	2' 11" to 170' 4"
16.	COAL, ...	11 ' to 171' 3'
17.	Slate, ...	9' 9" to 181' 0"
18.	Slate, ...	1' 11" to 182' 11"
19.	BUCK MOUNTAIN BED, ...	11' 7" to 194' 6"
20.	Sandstone, ...	19' 10" to 214 4"
21.	COAL, ...	4' 10" to 219' 2"
22.	Slate, ...	8' 3" to 227' 5"
23.	Sandstone, ...	8' 9" to 236' 2"
24.	Conglomerate, ...	2' 11" to 239' 1"
25.	Sandstone, ...	11" to 240' 0"
26.	Conglomerate, ...	1' 11" to 241' 11"
27.	Slate, ...	2' 6" to 244' 5"
28.	Conglomerate, ...	6' 9" to 251' 2"

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
29.	Sandstone,	17′ 11″ to 269′ 1″
30.	Conglomerate,	16′ 6″ to 285′ 7″
31.	Black sandstone,	1′ 11″ to 287′ 6″
32.	Conglomerate,	24′ 3″ to 311′ 9″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Kehley Run colliery, tunnel from Mammoth bed to Buck Mountain bed.

Thomas Coal Company.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED,	39′ 0″ to 39′ 0″
2.	Slate,	2′ 0″ to 41′ 0″
3.	Rock,	5′ 6″ to 46′ 6″
4.	Slate,	2′ 10″ to 49′ 4″
5.	COAL,	1′ 11″ to 51′ 3″
6.	Slate,	1′ 0″ to 52′ 3″
7.	SKIDMORE BED,	10′ 8″ to 62′ 11″
8.	Slate,	13′ 0″ to 75′ 11″
9.	Rock and pebbles,	3′ 9″ to 79′ 8″
10.	SEVEN-FOOT BED,	4′ 7″ to 84′ 3″
11.	Slate,	3′ 0″ to 87′ 3″
12.	Sandstone,	9′ 0″ to 96′ 3″
13.	Slate,	5′ 0″ to 101′ 3″
14.	COAL,	2′ 6″ to 103′ 9″
15.	Slate,	2′ 0″ to 105′ 9″
16.	Gray rock,	15′ 0″ to 120′ 9″
17.	Conglomerate,	21′ 6″ to 142′ 3″
18.	Sandstone,	22′ 6″ to 164′ 9″
19.	Gray rock,	10′ 0″ to 174′ 9″
20.	BUCK MOUNTAIN BED,	12′ 8″ to 187′ 5″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Kehley Run colliery, tunnel from Mammoth bed to Buck Mountain bed.

Thomas Coal Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, TOP SPLIT,	27′ 9″ to 27′ 9″	18′ 2′ to 18′ 2″
2.	Strata,	30′ 6″ to 58′ 3″	20′ 0″ to 38′ 2″
3.	MAMMOTH BED, BOTTOM SPLIT. Dip 41°,	50′ 0″ to 108′ 3″	32′ 8″ to 70′ 10″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
4.	Slate, tough, with iron ore balls,	12′ 0″ to 120′ 3″	7′ 9″ to 78′ 7″
5.	Hard sandstone,	6′ 0″ to 126′ 3″	3′ 11″ to 82′ 6″
6.	Hard slate with bands of sulphur of iron. Dip 38°,	9′ 0″ to 135′ 3″	5′ 6″ to 88′ 0″
7.	SKIDMORE BED,	17′ 0″ to 152′ 3″	10′ 6″ to 98′ 6″
8.	Slate,	5′ 6″ to 157 9″	3′ 5′ to 101′ 11″
9.	Slate and sandstone,	19′ 0″ to 176′ 9″	11′ 8′ to 113′ 7″
10.	Sandstone,	11′ 0″ to 187′ 9″	6′ 9″ to 120′ 4″
11.	SEVEN-FOOT BED. Dip 35°,	10′ 6″ to 198′ 3″	6′ 0″ to 126′ 4″
12.	Close hard slate,	19′ 0″ to 217′ 3′	10 10″ to 137′ 2″
13.	Soft slate,	2′ 6″ to 219′ 9″	1′ 5″ to 138′ 7″
14.	COAL and slate,	1′ 0″ to 220′ 9″	7″ to 139′ 2′
15.	Hard slate,	6′ 6″ to 227′ 3″	3′ 9″ to 142′ 11″
16.	Coarse hard SS.,	24′ 6″ to 251′ 9″	14′ 1″ to 157′ 0″
17.	Fine brecciated conglomerate,	24′ 0″ to 275′ 9″	13′ 9″ to 170′ 9′
18.	Slate,	3′ 0′ to 278′ 9″	1′ 9″ to 172′ 6″
19.	Fine hard sandstone with thin layers of slate. Dip 48°,	28′ 0″ to 306′ 9″	20′ 10′ to 193′ 4″
20.	Slippery slate,	13′ 0″ to 319′ 9″	9′ 8″ to 203′ 0″
21.	BUCK MOUNTAIN BED,	11′ 0″ to 330′ 9″	8′ 2″ to 211′ 2″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Kehley Run colliery, tunnel from Mammoth to Buck Mountain bed.

Thomas Coal Company.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 40° S.		
2.	Slate and sandstone,	40′ 0″ to 40′ 0″	28′ 4″ to 28′ 4″
3.	COAL. Dip 45°,	3′ 0″ to 43′ 0″	2′ 2″ to 30′ 6″
4.	Strata,	33′ 0″ to 76′ 0″	25′ 4″ to 55′ 10′
5.	SKIDMORE BED. Dip 55°,	4′ 6″ to 80′ 6″	3′ 5″ to 59′ 3″
6.	Strata,	23′ 0″ to 103′ 6″	18′ 10″ to 78′ 1″
7.	COAL. Dip 58°,	1′ 0″ to 104′ 6″	9″ to 78′ 10″
8.	Strata,	107′ 0″ to 211′ 6″	90′ 8″ to 169′ 6″
9.	BUCK MOUNTAIN BED,	10′ 6″ to 222′ 0″	8′ 11″ to 178′ 5″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Kehley Run colliery, tunnel from Mammoth to Seven-foot bed in new slope.

Thomas Coal Company.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip*
1.	**MAMMOTH BED**, . .	136′ 6″ to 136′ 6″	48′ 10″ to 48′ 10″
2.	Free slate. Dip 21°, .	16′ 0″ to 152′ 6″	5′ 9″ to 54′ 7″
3.	Hard sandstone, . .	16′ 0″ to 168′ 6″	5′ 9″ to 60′ 4″
4.	Fine conglomerate,	14′ 0″ to 182′ 6″	5′ 1″ to 65′ 5″
5.	Hard sandstone, . .	18′ 0″ to 200′ 6″	6′ 5″ to 71′ 10″
6.	Hard conglomerate,	15′ 0″ to 215′ 6″	5′ 4″ to 77′ 2″
7.	**SKIDMORE BED**, Dip 21°, ...	24′ 0″ to 239′ 6″	8′ 7″ to 85′ 9″
8.	Slate with iron ore balls, ...	29′ 0″ to 268′ 6″	10 0″ to 95′ 9″
9.	Hard sandstone, . .	12′ 0″ to 280′ 6″	4′ 10″ to 100′ 7″
10.	Slate with iron ore balls. Dip 24°, .	8 6″ to 289′ 0″	3′ 5″ to 104 0″
11.	**SEVEN-FOOT BED**. .	16′ 7″ to 305′ 7″	6′ 9″ to 110′ 9″

See Columnar Section Sheet No. 5 and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Indian Ridge colliery, bore-hole from Mammoth bed to conglomerate.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED**, .	44′ 0″ to 44′ 0″	43′ 9″ to 43′ 9′
2.	Slate, ...	5′ 6″ to 49′ 6″	5′ 6″ to 49′ 3″
3.	Conglomerate, . .	8′ 0″ to 57′ 6″	7′ 11″ to 57′ 2″
4.	Slate, ...	6′ 6″ to 64′ 0′	6′ 6′ to 63′ 8″
5.	**SKIDMORE BED**, .	8′ 4″ to 72′ 4″	8′ 3″ to 71′ 11″
6.	Slate, ...	11′ 2″ to 83′ 6″	11′ 1″ to 83′ 0′
7.	Sandstone, ...	2′ 0″ to 85′ 6″	2′ 0′ to 85′ 0″
8.	Slate, ...	5′ 0″ to 90′ 6″	5′ 0″ to 90′ 0″
9.	**SEVEN-FOOT BED**,	8′ 0″ to 98′ 6″	7′ 11″ to 97′ 11″
10.	Slate, ...	23′ 0″ to 121′ 6″	22′ 10″ to 120′ 9″
11.	Sandstone, ...	3′ 0″ to 124′ 6″	3′ 0″ to 123′ 9″
12.	Slate, ...	7′ 4″ to 131′ 10″	7′ 3″ to 131′ 0″
13.	Conglomerate, . .	1′ 6″ to 133′ 4″	1′ 6″ to 132′ 6″
14.	Slate, ...	9′ 0″ to 142′ 4′	8′ 11″ to 141′ 5″
15.	Conglomerate, . .	11′ 0″ to 153′ 4″	10′ 11″ to 152′ 4″
16.	Sandstone, ...	7′ 0″ to 160′ 4″	7′ 0″ to 159′ 4′
17.	Sandstone and conglomerate, . . .	5′ 6′ to 165′ 10″	5′ 6″ to 164′ 10″
18.	Conglomerate, . .	3′ 0″ to 168′ 10″	3′ 0″ to 167′ 10″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
19.	**BUCK MOUNTAIN BED,**	13' 8'' to 182' 6''	13' 7'' to 181' 5''
20.	Slate, ...	1' 0'' to 183' 6''	1' 0'' to 182' 5''
21.	Sandstone, ...	7' 0'' to 190' 6''	7' 0 ' to 189 5''
22.	Slate, ...	4' 6'' to 195' 0''	4' 6'' to 193' 11''
23.	**COAL,**	1' 0'' to 196' 0''	1' 0'' to 194' 11''
24.	Slate, ...	2' 6'' to 198' 6''	2' 6'' to 197' 5''
25.	**COAL,**	1' 10'' to 200' 4''	1' 10'' to 199' 3''
26.	Slate, ...	11' 10'' to 212' 2''	11' 9'' to 211' 0''
27.	Sandstone, ...	6' 6'' to 218' 8'	6' 6'' to 217' 6''
28.	Conglomerate, . .	3' 0'' to 221' 8''	3' 0'' to 220' 6''
29.	Sandstone and conglomerate, . . .	7' 0'' to 228' 8''	7' 0'' to 227' 6''
30.	Conglomerate, hard,	15' 0'' to 243' 8''	14' 11'' to 242' 5''
31.	Slate, ...	3' 6'' to 247' 2''	3' 6'' to 245' 11''
32.	Sandstone, ...	3' 0'' to 250' 2''	3' 0'' to 248' 11''
33.	Conglomerate, . .	21' 0'' to 271' 2''	20' 11'' to 269' 10''
34.	Sandstone, ...	2' 0'' to 273' 2''	2' 0'' to 271' 10''
35.	Conglomerate, . .	28' 6'' to 301' 8''	28' 4'' to 300' 2''
36.	Slate, ...	6'' to 302' 2''	6'' to 300' 8''
37.	Conglomerate, . .	21' 0'' to 323' 2''	20' 11'' to 321' 7''
38.	Conglomerate and sandstone, . . .	5' 0'' to 328' 2''	5' 0'' to 326' 7''
39.	Sandstone, ...	19' 0'' to 347' 2''	18' 11'' to 345' 6''
40.	Conglomerate, . .	15' 4'' to 362' 6''	15' 3'' to 360' 9''
41.	Sandstone, ...	3' 0'' to 365' 6''	3' 0'' to 363' 9''
42.	Conglomerate, . .	2' 0'' to 367' 6''	2' 0'' to 365' 9''
43.	Sandstone, ...	5' 6'' to 373' 0''	5' 6'' to 371' 3''
44.	Conglomerate, . .	9' 0'' to 382' 0''	8' 11'' to 380' 2''
45.	Sandstone, ...	39' 9'' to 421' 9''	39' 6'' to 419' 8''
46.	Sandstone and conglomerate, . . .	8' 0'' to 429' 9''	7' 11'' to 427' 7''
47.	Conglomerate, . .	26' 0'' to 455' 9''	25' 10'' to 453' 5''

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Field, Parts I and II.

Plank Ridge colliery, air shaft.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED,**	42' 4'' to 42' 4''
2.	Slate, ...	1' 11'' to 44' 3''
3.	Sandstone, ...	12' 10'' to 57' 1''
4.	Slate, ...	3' 11'' to 61' 0''
5.	**SKIDMORE BED,**	6' 0'' to 67' 0''
6.	Slate, ...	7' 10'' to 74' 10''
7.	Sandstone, ...	11' 4'' to 86 2''

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
8.	Slate,		2' 5'' to 88' 7''
9.	SEVEN-FOOT BED,		11' 11'' to 100' 6''
10.	Slate.		7' 11'' to 108' 5''
11.	Sandstone,		3' 11'' to 112' 4''
12.	Slate,		1' 6'' to 113' 10''
13.	Sandstone,		9' 4'' to 123' 2''
14.	Conglomerate,		33' 2'' to 156' 4''
15.	Sandstone and conglomerate,		11' 10'' to 168' 2''
16.	Slate,		6' 10'' to 175' 0''
17.	COAL,	BUCK MOUNTAIN BED,	12' 11'' to 187' 11''
18.	Slate,		3 5'' to 191' 4''
19.	COAL,		2' 5'' to 193' 9''
20.	Sandstone,		11' 10'' to 205' 7''

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Turkey Run colliery, tunnel between top and bottom members Mammoth bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED (Top split),	18' 0'' to 18 0''
2.	Slate,	10' 6'' to 28' 6''
3.	Sandstone,	12' 0'' to 40' 6''
4.	Hard rock,	61' 0'' to 101' 6''
5.	Sandstone,	2' 8'' to 104' 2''
6.	Slate,	3' 0'' to 107' 2''
7.	MAMMOTH BED (Bottom split),	25' 0'' to 132' 2''

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Turkey Run colliery, tunnel from Mammoth bed to Seven-foot bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 22° N.,	133' 8'' to 133' 8''	50' 0'' to 50' 0''
2.	Slate,	36' 4'' to 170' 0''	12' 5'' to 62' 5'
3.	SKIDMORE BED. Dip 19° N.,	16' 8'' to 186' 8''	5' 5'' to 67' 10''

No. of Strata.	*Description.* (Dip 29° S.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
4.	Slate, ...	1' 4'' to 188' 0''	5'' to 68' 3''
5.	Sandstone with streaks of slate, .	71' 4'' to 259' 4''	28' 2'' to 91' 5''
6.	Slate, ...	3' 5'' to 262' 9''	1' 1'' to 92' 6''
7.	SS. very hard, . . .	2' 7'' to 265' 4''	10'' to 93' 4''
8.	Slate, ...	3' 6'' to 268' 10''	1' 2'' to 94' 6''
9.	Hard sandstone, .	27' 6'' to 296' 4''	8' 11'' to 103' 5''
10.	Slate, ...	1' 8' to 298' 0''	6'' to 103' 11''
11.	SEVEN-FOOT BED. Dip 19° N., . . .	27' 8'' to 325' 8''	9' 1'' to 113' 0''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Shenandoah City colliery, tunnel No. 2, from Mammoth bed to Seven-foot bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 27° S., ...	110' 4'' to 110' 4''	50' 0'' to 50' 0''
2.	Slate, ...	3' 1'' to 113' 5''	1' 4'' to 51' 4''
3.	Hard slate, ...	20' 8'' to 134' 1''	9' 4'' to 60' 8''
4.	Sandstone, ...	10' 4'' to 144' 5''	3' 4'' to 64' 0''
5.	Slate, ...	11' 10'' to 156' 3''	3' 0'' to 67' 0''
6.	SKIDMORE BED. Dip 12° S., ...	31' 3'' to 187' 6''	6' 5'' to 73' 5''
7.	Slate, ...	3' 6'' to 191' 0''	9'' to 74' 2''
8.	Slaty sandstone, .	22' 6'' to 213' 6''	4' 8'' to 78' 10''
9.	Hard sandy slate, .	13' 4'' to 226' 10''	3' 3'' to 82' 1'
10.	Hard sandstone, .	3' 3'' to 230' 1''	9'' to 82' 10''
11.	Slate, ...	10' 0'' to 240' 1''	2' 5'' to 85' 3''
12.	Hard sandstone, .	2' 6'' to 242' 7''	8'' to 85' 11''
13.	Slate, ...	7' 0'' to 249' 7''	1' 10'' to 87' 9''
14.	Hard sandstone, .	17' 0'' to 266' 7''	4' 8'' to 92' 5''
15.	Slate, ...	11' 3'' to 277' 10''	3' 3'' to 95' 8''
16.	SEVEN-FOOT BED. Dip 17° S., . . .	21' 5'' to 299' 3''	6' 3'' to 101' 11''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Shenandoah City colliery, Water level tunnel (Seven-foot drift) from Mammoth bed to Seven-foot bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 30° S.,	100' 0" to 100' 0"	50' 0" to 50' 0"
2.	Hard slate,	8' 10" to 108' 10"	4' 5" to 54' 5"
3.	Slaty sandstone,	26' 11" to 135' 9"	13' 5" to 67' 10"
4.	Slate,	2' 5" to 138' 2"	1' 2" to 69' 0"
5.	SKIDMORE BED. Dip 30° S.,	14' 4" to 152' 6"	7' 2" to 76' 2"
6.	Slate,	1' 2" to 153' 8"	7" to 76' 9"
7.	Hard sandstone,	27' 3" to 180' 11"	13' 7" to 90' 4"
8.	Slate,	9' 8" to 190' 7"	4' 10" to 95' 2"
9.	Sandstone,	5" to 191' 0"	2" to 95' 4"
10.	Slate,	9' 8" to 200' 8"	4' 10" to 100' 2"
11.	Sandstone,	22' 2" to 222' 10"	10' 8" to 110' 10"
12.	Slate,	1' 3" to 224' 1"	8" to 111' 6"
13.	SEVEN-FOOT BED. Dip 28° S.,	12' 3" to 236' 4"	5' 9" to 117' 3"

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Kohinoor colliery, Rope Drill bore-hole No. 1, from surface to Mammoth bed.

P. & R. C. & I. Co.

No. of strata.	*Description.* (Dip horizontal.)	*Thicknesses perpendicular to dip.*
1.	Surface,	2' 0" to 2' 0"
2.	Shale and slate,	43' 0" to 45' 0"
3.	HOLMES BED,	6' 0" to 51' 0"
4.	Slate,	69' 0" to 120' 0"
5.	Conglomerate,	6' 0" to 126' 0"
6.	Sandstone slate,	24' 0" to 150' 0"
7.	Slate,	25' 0" to 175' 0"
8.	Coarse conglomerate,	30' 0" to 205' 0"
9.	Slate,	45' 0" to 250' 0"
10.	Coarse conglomerate,	45' 0" to 295' 0"
11.	Slate,	30' 0" to 325' 0"
12.	Sandstone,	72' 6" to 397' 6"
13.	Strata,	9' 5" to 406' 11"
14.	MAMMOTH BED,	42' 6" to 449' 5"

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Coal Field, Parts I and II.

Kohinoor colliery, new shaft from surface to Holmes bed.

P. & R. C. & I. Co.

No. of strata.	*Description.* (Dip 15° south.)	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Wash, ...	15′ 0″ to 15′ 0″	15′ 0″ to 15′ 0″
2.	COAL BED, ...	11′ 6″ to 26′ 6″	11′ 1″ to 26′ 1″
3.	Slate, ...	6′ 0″ to 32′ 6″	5′ 9″ to 31′ 10″
4.	COAL BED, ...	3′ 0″ to 35′ 6″	2′ 11″ to 34′ 9″
5.	Slate, ...	6′ 0″ to 41′ 6″	5′ 9″ to 40′ 6″
6.	Sandstone, ...	20′ 0″ to 61′ 6″	19′ 4″ to 59′ 10″
7.	Slate, ...	30′ 0″ to 91′ 6″	29′ 0″ to 88′ 10″
8.	Sandstone, ...	28′ 0″ to 119′ 6″	27′ 1″ to 115′ 11″
9.	Slate, ...	47′ 0″ to 166′ 6″	45′ 5″ to 161′ 4″
10.	HOLMES BED, ...	10′ 0″ to 176′ 6″	9′ 8″ to 171′ 0″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Kohinoor colliery, tunnel from Mammoth to Seven-foot bed on shaft No. 1 level.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 12° S.	——— ———	——— ———
2.	Sandstone, ...	20′ 0″ to 20′ 0″	4′ 0″ to 4′ 0″
3.	Slate. Dip 20°, S., . .	14′ 8″ to 34′ 8″	4′ 4″ to 8′ 4″
4.	COAL. Dip 14° S., . .	3′ 4″ to 38′ 0″	10″ to 9′ 2″
5.	Slate, ...	8′ 6″ to 46′ 6″	2′ 2″ to 11′ 4″
6.	SKIDMORE BED. Dip 14° S., ...	14′ 0″ to 60′ 6″	3′ 2″ to 14′ 6″
7.	Slate, ...	57′ 0″ to 117′ 6″	16′ 3″ to 30′ 9″
8.	Soft SS. Dip 19° S., . .	13′ 0″ to 130′ 6″	4′ 0″ to 34′ 9″
9.	Hard SS. Dip 12° S.,	35′ 0″ to 165′ 6″	7′ 0″ to 41′ 9″
10.	Soft slate and dirt, . .	9′ 0″ to 174′ 6″	2′ 0″ to 43′ 9″
11.	SS. and fine conglomerate. Dip 14½° S.,	21′ 0″ to 195′ 6″	4′ 8″ to 48′ 5″
12.	Slate. Dip 16° S., . .	6′ 0″ to 201′ 6″	1′ 10″ to 50′ 3″
13.	SEVEN-FOOT BED, . .	37′ 6″ to 239′ 0″	10′ 6″ to 60′ 9″

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Kohinoor colliery, Rope Drill bore-hole No. 3, from surface to Mammoth bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
1.	Surface, ...	4' 0' to 4' 0''	4' 0'' to 4' 0''
2.	COAL and dirt, . . .	11' 0'' to 15' 0''	11' 0'' to 15' 0''
3.	Slate. Dip flat, . . .	105' 0'' to 120' 0''	105' 0'' to 120' 0''
4.	COAL BED, ...	8' 0'' to 128' 0''	8' 0 ' to 128' 0''
5.	Slate, ...	107' 0'' to 235' 0''	107' 0'' to 235' 0''
6.	Conglomerate, . . .	95' 0'' to 330' 0''	95' 0'' to 330' 0''
7.	Slate, ...	49' 0'' to 379' 0''	49' 0'' to 379' 0''
8.	MAMMOTH BED, top split, ...	16' 6'' to 395' 6''	16' 6'' to 395' 6''
9.	Slate. Dip flat, . . .	13' 0'' to 408' 6''	13' 0'' to 408' 6''
10.	MAMMOTH BED, bottom split, ...	38' 0'' to 446' 6''	38' 0'' to 446' 6''

See Columnar Section Sheet No. V and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Section in vicinity of Ellangowan colliery.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Slate, ...	4' 8'' to 4' 8''
2.	BIG TRACY BED, ...	4' 3'' to 8' 11''
3.	Dark gray slate, ...	32' 10'' to 41' 9''
4.	Silicious rock, ...	18' 10'' to 60' 7'
5.	Dark gray slate, ...	3' 8'' to 64' 3''
6.	DIAMOND BED, ...	6' 9'' to 71' 0''
7.	Dark gray slate, ...	4' 8'' to 75' 8''
8.	Dark gray slate with iron ore balls, . .	38' 9'' to 114' 5 '
9.	Light sandstone, ...	14' 4'' to 128' 9'
10.	Dark gray slate, ...	30' 0'' to 158' 9''
11.	Conglomerate, ...	19' 9'' to 178' 6''
12.	Dark gray slate, ...	10' 4'' to 188' 10''
13.	LITTLE ORCHARD BED, ...	2' 10'' to 191' 8''
14.	Dark gray slate, ...	23' 6'' to 215' 2''
15.	ORCHARD BED, ...	10' 10'' to 226' 0''
16.	Dark gray slate, ...	78' 3'' to 304' 3''
17.	Dark sandstone, ...	16' 0' to 320' 3''
18.	Dark gray slate with iron ore balls, . .	57' 4'' to 377' 7''
19.	PRIMROSE BED, ...	8' 4'' to 385' 11''

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
20.	Dark gray slate with iron ore balls,	100′ 1″ to 486′ 0″
21.	HOLMES BED,	12′ 11″ to 498′ 11″
22.	Slate,	6′ 1″ to 505′ 0″
23.	COAL BED,	4′ 3″ to 509′ 3″
24.	Slate,	1′ 10″ to 511′ 1″
25.	Silicious rock,	62′ 6″ to 573′ 7″
26.	Slate,	4″ to 573′ 11″
27.	Sandstone,	56′ 6″ to 630′ 5″
28.	Slate,	9′ 5″ to 639′ 10″
29.	MAMMOTH BED (top split),	12′ 2″ to 652′ 0″
30.	Slate,	39′ 0″ to 691′ 0″
31.	MAMMOTH BED (middle split),	7′ 11″ to 698′ 11′
32.	Slate,	22′ 0″ to 720′ 11″
33.	MAMMOTH BED (bottom split),	15′ 0″ to 735′ 11″
34.	Slate,	6′ 4″ to 742′ 3″
35.	Conglomerate,	8′ 0″ to 750′ 3″
36.	Slate,	6′ 4″ to 756′ 7″
37.	SKIDMORE BED,	3′ 9″ to 760′ 4″
38.	Slate,	10′ 4″ to 770′ 8″
39.	Sandstone,	11′ 0″ to 781′ 8″
40.	Slate,	3′ 0″ to 784′ 8″
41.	SEVEN-FOOT BED,	6′ 6″ to 791′ 2″
42.	Slate,	8′ 11″ to 800′ 1″
43.	Sandstone,	3′ 9″ to 803′ 10″
44.	Slate,	8″ to 804′ 6″
45.	Sandstone,	8′ 11″ to 813′ 5″
46.	Conglomerate,	42′ 9″ to 856′ 2″
47.	Slate,	6′ 4″ to 862′ 6″
48.	BUCK MOUNTAIN BED,	12′ 3″ to 874′ 9″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Ellangowan colliery shaft.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Slate wash with iron ore balls,	117′ 0″ to 117′ 0″
2.	HOLMES BED,	14′ 6″ to 131′ 6″
3.	Slate,	6′ 6″ to 138′ 0″
4.	COAL BED,	3′ 5″ to 141′ 5″
5.	Slate,	2′ 0″ to 143′ 5″
6.	Gray rock,	67′ 0″ to 210′ 5″
7.	Slate,	4″ to 210′ 9″
8.	Sandstone,	59′ 0″ to 269′ 9″
9.	Slate,	10′ 0″ to 279′ 9″

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
10.	Black jack,	Mammoth bed (top split).	1′ 0″ to 280′ 9″
11.	Coal bed,		3′ 0″ to 283′ 9″
12.	Bone, . . .		1′ 6 ′ to 285′ 3″
13.	Coal bed,		3′ 0″ to 288′ 3″
14.	Stone, . .		1′ 0″ to 289′ 3″
15.	Coal bed,		3′ 0″ to 292′ 3′·
16.	Stone, . .		6″ to 292′ 9″
17.	Coal bed,		3′ 6″ to 296′ 3″
18.	Slate, ...		18′ 0″ to 314′ 3″
19.	Mammoth bed (middle split), ...		14 0″ to 328′ 3″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Ellangowan colliery, tunnel from Primrose to Holmes bed, on shaft level west.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Primrose bed.		
2.	Slate, ...	22′ 7″ to 22′ 7′	7′ 4″ to 7′ 4′·
3.	Coal. Dip 19^{C}, . . .	6′ 4″ to 28′ 11″	2′ 1″ to 9′ 5″
4.	Slate and iron ore balls, ...	28′ 2″ to 57′ 1″	9· 7″ to 19′ 0″
5.	Hard gray sandstone,	6′ 7″ to 63′ 8″	2′ 3′· to 21′ 3″
6.	Slate and iron ore balls, ...	6′ 7″ to 70′ 3″	2′ 3″ to 23′ 6″
7.	Hard gray sandstone,	6′ 8″ to 76′ 11″	2 5″ to 25′ 11″
8.	Slate and iron ore balls, ...	5′ 11′· to 82′ 10″	2′ 2″ to 28′ 1″
9.	Hard gray sandstone,	7′ 1″ to 89′ 11″	2′ 7″ to 30′ 8″
10.	Slate and iron ore balls, ...	12 3″ to 102′ 2″	4′ 5″ to 35′ 1″
11.	Hard gray sandstone,	1′ 11″ to 104′ 1″	8″ to 35′ 9″
12.	Slate and iron ore balls, ...	6′ 10″ to 110′ 11″	2′ 6″ to 38′ 3″
13.	Hard gray sandstone,	5′ 8″ to 116′ 7″	2′ 1″ to 40′ 4″
14.	Slate and iron ore balls, ...	28′ 8″ to 145′ 3 ′	10′ 6″ to 50′ 10″
15.	Hard gray sandstone,	4′ 6″ to 149′ 9″	1′ 8″ to 52′ 6″
16.	Slate and iron ore balls. Dip 21½°, . .	47′ 6″ to 197′ 3″	17′ 5″ to 69′ 11″
17.	Hard gray sandstone,	8′ 6″ to 205′ 9″	3′ 1″ to 73′ 0′·
18.	Slate. Dip 21½°, . .	37′ 6″ to 243′ 3″	13′ 9″ to 86′ 9″
19.	Holmes bed.		

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Ellangowan colliery, tunnel from Orchard bed to Primrose bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	ORCHARD BED. Dip 28½°, ...	21′ 7″ to 21′ 7″	10′ 3′ to 10′ 3″
2.	Slate with hard blue SS. boulders, . .	35′ 10″ to 57′ 5″	17′ 0″ to 27′ 3″
3.	Hard sandstone, .	4′ 4″ to 61′ 9″	2′ 0″ to 29′ 3″
4.	Slate, ...	19′ 11″ to 81′ 8″	9′ 6″ to 38′ 9″
5.	Sandstone, ...	11′ 11″ to 93′ 7″	5′ 8″ to 44′ 5″
6.	Slate, ...	6′ 2″ to 99′ 9″	2′ 11″ to 47′ 4″
7.	Hard blue SS., . .	3′ 9″ to 103′ 6″	1′ 10″ to 49′ 2″
8.	Slate, ...	16′ 11″ to 120′ 5″	8′ 2″ to 57′ 4″
9.	Hard blue sandstone. Dip 29°, .	1′ 3″ to 121′ 8″	8″ to 58′ 0″
10.	Slate, ...	1′ 11″ to 123′ 7″	11″ to 58′ 11″
11.	Hard blue SS., . .	1′ 9″ to 125′ 4″	10″ to 59′ 9″
12.	Slate, ...	3′ 9′ to 129′ 1″	1′ 10″ to 61′ 7″
13.	Hard blue SS., . .	1′ 9″ to 130′ 10′	10″ to 62′ 5″
14.	Slate, hard, ...	7′ 8″ to 138′ 6″	3′ 7″ to 66′ 0″
15.	Slate and soft sandstone mixed, . .	8′ 7″ to 147′ 1″	4′ 0′ to 70′ 0′
16.	Hard sandstone, .	47′ 7″ to 194′ 8″	21′ 7″ to 91′ 7″
17.	Hard slate. Dip 27°,	7′ 9″ to 202′ 5″	3′ 6″ to 95′ 1″
18.	Bone and slate, . .	2′ 4″ to 204′ 9″	1′ 0″ to 96′ 1″
19.	Hard slate, ...	16′ 9″ to 221′ 6″	7′ 7″ to 103′ 8″
20.	Coal dirt. Dip 27°,	9″ to 222′ 3″	4″ to 104′ 0″
21.	Hard slate. Dip 29°,	19′ 6″ to 241′ 9″	9′ 5″ to 113′ 5″
22.	Slate and hard SS.,	12′ 1″ to 253′ 10″	5′ 11″ to 119′ 4′
23.	Fine conglomerate. Dip 24°, ...	7′ 3″ to 261′ 1″	2′ 11″ to 122′ 3″
24.	Hard sandstone, .	53 5″ to 314′ 6″	21′ 8″ to 143′ 11′
25.	Slate, ...	2′ 7″ to 317′ 1″	1′ 1″ to 145′ 0″
26.	PRIMROSE BED. Dip 25°, ...	23′ 5″ to 340′ 6″	9′ 11″ to 154′ 11″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Ellangowan colliery, tunnel from Mammoth to Seven-foot bed, on counter level.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, BOTTOM SPLIT. Dip 30°, ...	22′ 8″ to 22′ 8″	11′ 4″ to 11′ 4′
2.	Slate, ...	23′ 0″ to 45′ 8″	11′ 5″ to 22′ 9″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
3.	**Skidmore bed**, .	11' 7'' to 57' 3''	5' 8'' to 28' 5''
4.	Soft slate, ...	11' 6'' to 68' 9''	5' 5'' to 33' 10''
5.	Hard slaty SS., . .	14' 6'' to 83' 3''	6' 4'' to 40' 2''
6.	Hard slate, ...	8' 0'' to 91' 3''	3' 4'' to 43' 6''
7.	Slate, **coal** and bone, ...	4' 0'' to 95'' 3''	1' 8'' to 45' 2''
8.	Strata, ...	61' 0'' to 156' 3''	25' 0'' to 70' 2''
9.	**Seven-foot bed**. Dip 23°, ...	9' 8'' to 165' 11''	3' 8'' to 73' 10''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Knickerbocker colliery, tunnel from Holmes bed to top member Mammoth bed near foot of Barry slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**Holmes bed**. Dip 47° S., ...	22' 9' to 22' 9''	16' 8'' to 16' 8''
2.	Slate, ...	20' 0'' to 42' 9''	15' 7'' to 32' 3''
3.	Very hard sandstone,	4' 6'' to 47' 3''	3' 6'' to 35' 9''
4.	Slate. Dip 56° S., .	26' 2'' to 73' 5''	21' 8'' to 57' 5''
5.	Hard sandstone, . .	65' 10'' to 139' 3''	54' 7'' to 112' 0''
6.	Slate, ...	5' 4'' to 144' 7''	4' 5'' to 116' 5''
7.	Coal dirt. Dip 58° S.,	6'' to 145' 1''	5'' to 116' 10''
8.	Hard sandstone, . .	9' 4'' to 154' 5''	7' 5'' to 124' 3''
9.	Slate, ...	4' 10'' to 159' 3'	3' 10'' to 128' 1''
10.	**Mammoth bed** (top split). Dip 45° S., ...	19' 11'' to 179' 2'	14' 1'' to 142' 2''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Knickerbocker (Barry) colliery, tunnel from Mammoth bed through Seven-Foot bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	**Mammoth bed** (top split), ...	20' 0'' to 20' 0''
2.	Hard slate, ...	18' 0' to 38' 0''
3.	**Mammoth bed** (middle split), ...	2' 4'' to 40' 4''
4.	Slate, ...	11' 9'' to 52' 1''
5.	Fine conglomerate, ...	27' 0'' to 79' 1''
6.	Hard sandstone, ...	15' 0'' to 94' 1'
7.	**Mammoth bed** (bottom split), ...	6' 0'' to 100' 1''

No. of strata.	Description.	Thicknesses measured vertically.	Thicknesses perpendicular to dip.
8.	Slate,		5' 6" to 105' 7"
9.	Fine conglomerate,		27' 6" to 133' 1"
10.	Soft slate,		2' 3" to 135' 4"
11.	Sandstone,		5' 0" to 140' 4"
12.	Conglomerate,		20' 0" to 160' 4"
13.	Hard sandstone,		6' 9" to 167' 1"
14.	SKIDMORE BED,		12' 6" to 179' 7'
15.	Soft slate,		2' 0" to 181' 7"
16.	Hard slate,		12' 0' to 193' 7"
17.	Sandstone,		9' 0" to 202' 7"
18.	Slate,		6' 0" to 208' 7"
19.	COAL,		6" to 209' 1"
20.	Slate,		15' 6" to 224' 7"
21.	SEVEN-FOOT BED,		4' 0" to 228' 7"
22.	Soft slate,		3' 3" to 231' 10"
23.	Hard slate,		3' 6" to 235' 4"
24.	Sandstone,		14' 0' to 249' 4"
25.	COAL,		2' 3" to 251' 7"
26.	Slate,		5' 0" to 256' 7"
27.	Coarse conglomerate,		24' 6" to 281' 1"

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Coal Field, Part II.

Suffolk colliery, tunnel from Holmes bed to Mammoth bed, bottom split.

P. & R. C. & I. Co.

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	HOLMES BED. Dip 59° N.,	9 7" to 9' 7"	8' 3" to 8' 3"
2.	Slate,	23' 2" to 32' 9"	20' 8" to 28' 11"
3.	COAL,	3' 0" to 35' 9"	2' 9" to 31' 8"
4.	Slate. Dip 67° N.,	2' 7" to 38' 4"	2' 4" to 34' 0"
5.	Hard sandstone,	32' 7" to 70' 11"	29' 8" to 63' 8"
6.	COAL dirt,	1" to 71' 0"	1" to 63' 9"
7.	Slate,	21' 0' to 92' 0"	18' 10" to 82' 7"
8.	Hard slate with iron ore balls,	6' 5" to 98' 5"	5' 9" to 88' 4"
9.	COAL dirt,	5" to 98' 10"	4" to 88' 8"
10.	Slate,	2 6" to 101' 4"	1' 11" to 90' 7"
11.	Hard sandstone,	83' 9" to 185' 1"	72' 6" to 163' 1"
12.	Slate,	5' 0" to 190' 1"	4' 2" to 167' 3"
13.	MAMMOTH BED (top split). Dip 56° N.,	24' 0" to 214' 1"	19' 11" to 187' 2"

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
14.	Hard slate with iron ore balls, ...	11′ 7″ to 225′ 8″	9′ 9″ to 196′ 11′
15.	Hard sandstone, . .	52′ 7″ to 278′ 3″	45′ 2″ to 242′ 1″
16.	Coal, ...	5″ to 278′ 8″	4″ to 242′ 5″
17.	Sandstone, ...	25′ 9′ to 304′ 5″	22′ 8″ to 265′ 1″
18.	Mammoth bed (bottom split). Dip 65° N., . . .	35′ 7″ to 340′ 0′	32′ 3″ to 297′ 4″
19.	Slate, ...	8′ 4″ to 348 4″	7′ 6″ to 304′ 10″
20.	Sandstone, ...	4′ 2″ to 352′ 6″	3′ 9″ to 308′ 7″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Suffolk colliery, tunnels from the Tracy bed to the Holmes bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Tracy bed. Dip 7°,		93′ 0″ to 93′ 0″	10′ 8″ to 10′ 8″
2.	Dark slate, ...		64′ 0″ to 157′ 0″	9′ 0″ to 19′ 8″
3.	Hard gray SS., . .		249′ 0″ to 406′ 0″	63′ 0″ to 82′ 8″
4.	Black slate, . . .		24′ 0″ to 430′ 0″	8′ 6″ to 91′ 2″
5.	Diamond bed. Dip 22°, ...		9′ 10″ to 439′ 10″	3′ 9″ to 94′ 11″
6.	Black slate, . . .		88′ 0″ to 527′ 10″	45′ 6″ to 140′ 5″
7.	Sandstone. Dip 37°,		20′ 0″ to 547′ 10″	12′ 10″ to 153′ 3″
8.	Dark slate, ...		50′ 0″ to 597′ 10″	31′ 0″ to 184′ 3″
9.	Orchard bed. Dip 37°, ...		12′ 0″ to 609′ 10″	7′ 6″ to 191′ 9″
10.	Sandstone, ...		106′ 0″ to 715′ 10″	77′ 6″ to 269′ 3″
11.	Hard gray SS., .		8′ 6″ to 724′ 4″	7′ 0″ to 276′ 3″
12.	Hard slate, ...		16′ 6″ to 740′ 10″	14′ 0″ to 290′ 3″
13.	SS. and cong., . .		31′ 0″ to 771′ 10″	25′ 6″ to 315′ 9″
14.	Slate, ...		6′ 0″ to 777′ 10″	5′ 0″ to 320′ 9″
15.	Coal,	Primrose bed Dip 56°.	4′ 6″ to 782′ 4″	3′ 10″ to 324′ 7″
16.	Slate,		11′ 0″ to 793′ 4″	9′ 3″ to 333′ 10″
17.	Coal,		3′ 6″ to 796′ 10″	3′ 0″ to 336′ 10″
18.	Slate,		11′ 6″ to 808′ 4″	9′ 0″ to 345′ 10″
19.	Coal,		4′ 6″ to 812′ 10″	4′ 0″ to 349′ 10″
20.	Slate. Dip 60°, . .		5′ 0″ to 817′ 10″	4′ 3″ to 354′ 1′
21.	Sandstone, ...		34′ 0″ to 851′ 10″	30′ 0″ to 384′ 1″
22.	Slate, ...		34′ 0″ to 885′ 10″	30′ 8″ to 414′ 9″
23.	Hard gray SS. . .		5′ 0″ to 890′ 10″	4′ 9″ to 419′ 6″
24.	Slate. Dip 65°, . .		19′ 0″ to 909′ 10″	18′ 0″ to 437′ 6″
25.	Holmes bed. Dip 59° N., ...		9′ 7″ to 919′ 5″	8′ 3″ to 445′ 9″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Gilberton colliery, tunnel from Mammoth to Buck Mountain bed, on 1st level of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED.**			
2.	Strata, ...		23' 0'' to 23' 0''	16' 3'' to 16' 3''
3.	**COAL,**	**SKIDMORE BED.** Dip 45° S.,	0' 9'' to 23' 9''	6'' to 16' 9''
4.	Slate,		2' 0'' to 25' 9''	1' 5'' to 18' 2''
5.	**COAL,**		4' 3'' to 30' 0''	3' 0'' to 21' 2''
6.	Strata, ...		58' 0'' to 88' 0''	40' 0'' to 61' 2''
7.	**SEVEN-FOOT BED.** Dip 42° S., ...		9' 0'' to 97' 0''	6' 0'' to 67' 2''
8.	Strata, ...		82' 6'' to 179' 6''	55' 0'' to 122' 2''
9.	**BUCK MOUNTAIN BED.** Dip 40° S., ...		12' 6'' to 192' 0''	8' 0'' to 130' 2''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Gilberton colliery, tunnel from Mammoth bed through Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED,**		40' 0'' to 40' 0''
2.	Slate, ...		15' 0'' to 55' 0''
3.	**COAL,**	**SKIDMORE BED.**	1' 3'' to 56' 3''
4.	Slate,		1' 5'' to 57' 8''
5.	**COAL,**		3' 0'' to 60' 8''
6.	Slate, ...		7' 0'' to 67' 8''
7.	Sandstone, ...		16' 4'' to 84' 0''
8.	Conglomerate, ...		5' 2'' to 89' 2''
9.	Slate, ...		14' 0'' to 103' 2''
10.	**SEVEN-FOOT BED,**		8' 0'' to 111' 2''
11.	Slate, ...		6' 0'' to 117' 2''
12.	Sandstone, ...		13' 0'' to 130' 2''
13.	Conglomerate, ...		6' 8'' to 136' 10''
14.	Sandstone, ...		17' 0'' to 153' 10''
15.	Conglomerate, ...		17' 0'' to 170' 10''
16.	**BUCK MOUNTAIN BED,**		4' 9'' to 175' 7''
17.	Slate, ...		15' 5'' to 191' 0''
18.	Sandstone, ...		7' 0'' to 198' 0''
19.	Slate, ...		3' 0'' to 201' 0''
20.	Sandstone, ...		4' 0'' to 205' 0''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

North Laurel Ridge colliery, tunnel from Mammoth to Buck Mountain bed, on water level.

S. H. Barrett.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 48° S.,	62′ 0″ to 62′ 0″	46′ 0″ to 46′ 0″
2.	Slate,	19′ 0″ to 81′ 0″	14′ 0″ to 60′ 0″
3.	COAL,	1′ 4″ to 82′ 4″	1′ 0″ to 61′ 0″
4.	Slate, } SKIDMORE BED.	3′ 3″ to 85′ 7″	2′ 0″ to 63′ 0″
5.	COAL,	2′ 3″ to 87′ 10″	2′ 0″ to 65′ 0″
6.	Slate,	16′ 3″ to 104′ 1″	11′ 0″ to 76′ 0″
7.	Sandstone,	2′ 4″ to 106′ 5″	2′ 0″ to 78′ 0″
8.	Hard rock,	21′ 11″ to 128′ 4″	16′ 0″ to 94′ 0″
9.	SEVEN-FOOT BED,	5′ 2″ to 133′ 6″	4′ 7″ to 98′ 7″
10.	Slate,	8′ 3″ to 141′ 9″	5′ 5″ to 104′ 0″
11.	Sandstone,	2′ 0′ to 143′ 9″	2′ 0″ to 106′ 0″
12.	Hard rock,	19′ 7″ to 163′ 4″	16′ 0″ to 122′ 0″
13.	COAL and dirt,	1′ 0″ to 164′ 4″	1′ 0″ to 123′ 0″
14.	Slate,	3′ 0″ to 167′ 4″	2′ 3″ to 125′ 3′
15.	Sandstone,	22′ 0″ to 189′ 4″	16′ 9″ to 142′ 0″
16.	Rock,	36′ 4″ to 225′ 8″	28′ 0″ to 170′ 0″
17.	Slate,	3′ 0″ to 228′ 8″	2′ 0″ to 172′ 0″
18.	Sandstone,	11′ 6″ to 240′ 2″	10′ 0″ to 182′ 0″
19.	Slate,	7′ 6″ to 247′ 8″	5′ 6″ to 187′ 6″
20.	BUCK MOUNTAIN BED. Dip 55° S.,	9′ 4″ to 257′ 0″	8′ 6″ to 196′ 0″
21.	Slate,	5′ 9″ to 262′ 9″	4′ 0″ to 200′ 0″
22.	Sandstone,	3′ 7″ to 266′ 4″	2′ 6″ to 202′ 6″
23.	Rock,	19′ 2″ to 285′ 6″	16′ 6″ to 219′ 0″
24.	COAL BED,	4′ 0″ to 289′ 6″	3′ 4″ to 222′ 4″

See Columnar Section Sheet No. VI, Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

South Laurel Ridge colliery, Diamond drill bore-hole from the Buck Mountain bed, (bored horizontally.)

S. H Barrett.

No. of strata.	*Description.* (Dip 47° N).	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	BUCK MOUNTAIN BED.		
2.	Sandy slate, rotten,	3′ 5″ to 3′ 5″	2′ 6″ to 2′ 6″
3.	Sandstone,	7′ 7″ to 11′ 0′	5′ 7′ to 8′ 1″
4.	Fine conglomerate,	3′ 0″ to 14′ 0″	2′ 2″ to 10′ 3″
5.	Sandstone,	15′ 7″ to 29′ 7″	11′ 5″ to 21′ 8″
6.	Conglomerate,	4′ 0″ to 33′ 7″	2′ 10″ to 24′ 6″
7.	Gray sandstone,	12′ 0″ to 45′ 7″	8′ 10″ to 33′ 4″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
8.	Conglomerate, . . .	7′ 2″ to 52′ 9″	5′ 5″ to 38′ 9′
9.	Gray sandstone, . .	8′ 0″ to 60′ 9″	5′ 3″ to 44′ 0″
10.	Conglomerate, . . .	8′ 2″ to 63′ 11″	2′ 4″ to 46′ 4″
11.	Rotten slate, ...	1′ 0″ to 64′ 11″	9″ to 47′ 1″
12.	Conglomerate, . . .	4′ 5″ to 69′ 4″	3′ 3″ to 50′ 4″
13.	Gray sandstone, . .	3′ 1″ to 72′ 5″	2′ 4″ to 52′ 8″
14.	Conglomerate, . . .	17′ 8″ to 90′ 1″	12′ 11″ to 65′ 7″
15.	Rotten gray SS. . . .	1′ 10″ to 91′ 11′	1′ 5″ to 67′ 0″
16.	Conglomerate, . . .	28′ 6′ to 120′ 5″	20′ 10″ to 87′ 10″
17.	Slate, ...	1′ 0″ to 121′ 5″	9″ to 88′ 7″
18.	Conglomerate, . . .	16′ 4″ to 137′ 9″	11′ 10″ to 100′ 5″
19.	Sandstone, ...	1′ 4″ to 139′ 1″	11″ to 101′ 4″
20.	Conglomerate, . . .	11′ 3″ to 150′ 4″	8′ 4″ to 109′ 8″
21.	Rotten sandstone, .	4′ 8″ to 155′ 0″	3′ 5″ to 113′ 1″
22.	Conglomerate, . . .	5′ 0′ to 160′ 0″	3′ 8′ to 116′ 9″
23.	Rotten sandstone, .	5′ 2″ to 165′ 2″	3′ 10″ to 120′ 7″
24.	Black slate, ...	2′ 2′ to 167′ 4″	1′ 7″ to 122′ 2″
25.	Sandstone, ...	10′ 9′ to 178′ 1″	7′ 10″ to 130′ 0′
26.	Conglomerate, . . .	6′ 10″ to 184′ 11″	5′ 1″ to 135′ 1″
27.	Shelly slate, ...	4″ to 185′ 3″	3″ to 135′ 4″
28.	Conglomerate, . . .	2′ 0″ to 187′ 3″	1′ 6″ to 136′ 10″
29.	Gray sandstone, . . .	1′ 8″ to 188′ 11″	1′ 3″ to 138′ 1″
30.	Conglomerate, . . .	9′ 2″ to 198′ 1″	6′ 9″ to 144′ 10′
31.	Sandstone, ...	2′ 3″ to 200′ 4″	1′ 7″ to 146′ 5″
32.	Conglomerate, . . .	5″ to 200′ 9″	3″ to 146′ 8″
33.	Rotten sandstone, .	6′ 6″ to 207′ 3″	4′ 9″ to 151′ 5″
34.	Rotten conglomerate,	9″ to 208′ 0″	7″ to 152′ 0′
35.	Gray sandstone, . . .	8′ 2″ to 216′ 2″	6′ 0″ to 158′ 0″
36.	Conglomerate, . . .	2′ 4″ to 218′ 6″	1′ 8″ to 159′ 8″
37.	Gray sandstone, . . .	12′ 5″ to 230′ 11″	9′ 1″ to 168′ 9″
38.	Rotten stone and clay, ...	6′ to 231′ 5″	5″ to 169′ 2″
39.	Rotten conglomerate,	4′ 6″ to 235′ 11″	3′ 4″ to 172′ 6″
40.	Coarse gray SS., . .	3′ 8″ to 239′ 7″	2′ 8″ to 175′ 2″
41.	Conglomerate, . . .	9′ 3″ to 248′ 10″	6′ 10′ to 182′ 0″
42.	Sandstone, ...	7′ 11″ to 256′ 9″	5′ 9″ to 187′ 9″
43.	Conglomerate, . . .	1′ 6′ to 258′ 3″	1′ 1″ to 188′ 10″
44.	Rotten sandstone, . .	3′ 7″ to 261′ 10″	2′ 7″ to 191′ 5″
45.	Conglomerate, . . .	7′ 7′ to 269′ 5″	5′ 7″ to 197′ 0″
46.	Coarse gray SS., . .	6′ 3″ to 275′ 8″	4′ 8″ to 201′ 8″
47.	Conglomerate, . . .	7′ 11″ to 283′ 7″	5′ 9″ to 207′ 5″
48.	Gray rock, ...	3′ 6″ to 287′ 1″	2′ 7″ to 210′ 0″
49.	Conglomerate, . . .	4′ 3″ to 291′ 4″	3′ 2″ to 213′ 2″
50.	Dark rotten SS., . .	1′ 2″ to 292′ 6″	10″ to 214′ 0″
51.	Conglomerate, . . .	3′ 5″ to 295′ 11″	2′ 6″ to 216′ 6″
52.	Gray rock and SS.,	15′ 2″ to 311′ 1″	11′ 1″ to 227′ 7″
53.	Conglomerate, . . .	7′ 9″ to 318′ 10″	5′ 8″ to 233′ 3″
54.	Gray sandstone, . . .	4′ 1″ to 322′ 11″	3′ 0″ to 236′ 3″
55.	Conglomerate hard, .	19′ 5″ to 342′ 4″	14′ 2″ to 250′ 5″
56.	Gray rock, ...	1′ 8″ to 344′ 0″	1′ 2″ to 251′ 7″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
57.	Conglomerate hard, .	6' 11" to 350' 11"	5' 0" to 256' 7"
58.	Black slate, ...	1' 4" to 352' 3"	11" to 257' 6"
59.	Conglomerate, . .	17' 9" to 370' 0"	13' 0" to 270' 6"
60.	Black slate, ...	3" to 370' 3"	3" to 270' 9"
61.	Fine, hard, gray rock,	13' 0" to 383' 3"	9' 6' to 280' 3"
62.	Conglomerate, . . .	1' 10" to 385' 1"	1' 4" to 281' 7"
63.	Fine gray rock, . . .	1' 10" to 386' 11"	1' 4" to 282' 11"
64.	Conglomerate, . . .	9" to 387' 8"	7" to 283' 6"
65.	Fine gray rock, . . .	29' 3" to 416' 11"	21' 5" to 304' 11"
66.	Conglomerate, . . .	3' 10" to 420' 9"	2' 9" to 307' 8"
67.	Slate, ...	5" to 421' 2"	4" to 308' 0"
68.	Conglomerate, . . .	4' 5" to 425' 7"	3' 3" to 311' 3"
69.	Black slate, ...	10" to 426' 5"	8" to 311' 11"
70.	Conglomerate, . . .	3' 3" to 429' 8"	2' 5" to 314' 4"
71.	Dark sandstone, . .	7' 9" to 437' 5"	5' 8" to 320' 0"
72.	Fine gray rock, . . .	8' 0" to 445' 5"	5' 10" to 325' 10"
73.	Conglomerate, . . .	2' 1" to 447' 6"	1' 6" to 327' 4"
74.	COAL, ...	1½" to 447' 7½"	1 ' to 327' 5"
75.	Conglomerate, . . .	18' 8½" to 466' 4"	13' 8 ' to 341' 1"
76.	Dark sandstone, . . .	13' 11" to 480' 3"	10' 2' to 351' 3"
77.	Fine gray rock, . . .	13' 1" to 493' 4"	9' 7" to 360' 10"
78.	Conglomerate hard, .	1' 8" to 495' 0"	1' 3" to 362' 1"
79.	Shelly slate, ...	7" to 495' 7"	5" to 362' 6"
80.	Conglomerate, . . .	2' 5" to 498' 0"	1' 9" to 364' 3"
81.	Gray rock, ...	8' 1" to 506' 1"	5' 11" to 370' 2'
82.	Conglomerate hard,	56' 10" to 562' 11"	41' 7" to 411' 9"
83.	Gray sandstone, . . .	12' 2" to 575' 1"	8' 11" to 420' 8"
84.	Slate, ...	1' 10" to 576' 11"	1' 5" to 422' 1"
85.	Gray sandstone, . . .	3' 6" to 580' 5"	2' 7" to 424' 8"
86.	Conglomerate, . . .	5' 3" to 585' 8"	3' 10" to 428' 6"
87.	Gray sandstone, . . .	10' 9" to 596 5"	7' 9" to 436' 3"
88.	Conglomerate, . . .	3' 9" to 600' 2"	2' 10" to 439' 1"
89.	Dark sandstone, . .	1' 0" to 601' 2"	9" to 439' 10"
90.	Conglomerate, . . .	2' 4" to 603' 6"	1' 8" to 441' 6"
91.	Gray sandstone, . . .	7' 7" to 611' 1"	5' 7" to 447' 1"
92.	Conglomerate, . . .	9' 2" to 620' 3"	6' 9" to 453' 10"
93.	Gray sandstone, . . .	15' 10" to 636' 1"	11' 7' to 465' 5"
94.	Conglomerate, . . .	4' 0" to 640' 1"	3' 0" to 468' 5"
95.	Slate, ...	5" to 640' 6"	3" to 468' 8"
96.	Gray sandstone, . . .	1' 7" to 642' 1"	1' 2" to 469 10"

See Columnar Section Sheet No. VI and Mine Sheet No. III, Atlas Western Middle Anthracite Field, Parts I and II.

Draper colliery, water-level tunnel from surface through Mammoth bed.

Oliver Ditson.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Gravel and wash, .	112' 0'' to 112' 0''	112' 0'' to 112' 0''
2.	Sandstone, ...	29' 0'' to 141' 0''	20' 6'' to 132' 6''
3.	Soft slate, ...	8' 0'' to 149' 0''	5' 8'' to 138' 2''
4.	Conglomerate, . .	4' 0'' to 153' 0''	2' 10'' to 141' 0''
5.	Sandstone, ...	3' 6'' to 156' 6''	2' 6'' to 143' 6'
6.	COAL, ...	2' 6'' to 159' 0''	1' 9'' to 145' 3''
7.	Soft slate, ...	16' 0'' to 175' 0''	11' 4'' to 156' 7''
8.	COAL and bone, . .	2' 0'' to 177' 0''	1' 6'' to 158' 1''
9.	Hard slate, ...	14' 6'' to 191' 6''	10' 3'' to 168' 4''
10.	Hard sandstone,	37' 0'' to 228' 6''	26' 2'' to 194' 6''
11.	COAL, ...	1' 0'' to 229' 6''	8'' to 195' 2''
12.	Soft slate, ...	8' 0'' to 237' 6''	5' 8'' to 200' 10''
13.	COAL, ...	2' 6'' to 240' 0''	1' 9'' to 202' 7''
14.	Hard slate, ...	34' 6'' to 274' 6''	24' 4' to 226' 11''
15.	Hard sandstone, .	14' 0'' to 288' 6''	9' 11'' to 236' 10''
16.	Hard slate, ...	46' 0'' to 334' 6''	32' 6'' to 269' 4''
17.	PRIMROSE BED, .	13' 0'' to 347' 6''	9' 2'' to 278' 6''
18.	Slate, ...	7' 0'' to 354' 6''	5' 0'' to 283' 6''
19.	Sandstone.	27' 0'' to 381' 6''	19' 1'' to 302' 7''
20.	Slate, ...	16' 0'' to 397' 6''	11' 4'' to 313' 11''
21.	HOLMES BED, . . .	6' 0'' to 403' 6''	4' 3'' to 318' 2''
22.	Slate, ...	6' 0'' to 409' 6''	4' 3'' to 322' 5''
23.	Soft sandstone. . .	18' 0'' to 427' 6''	12' 9'' to 335' 2''
24.	Hard slate, ...	33' 0'' to 460' 6''	23' 4'' to 358' 6''
25.	Soft slate, ...	1' 0'' to 461' 6''	8'' to 359' 2''
26.	Sandstone, ...	150' 0'' to 611' 6''	106' 0'' to 465' 2''
27.	Black sandstone, .	16' 0'' to 627' 6''	11' 4'' to 476' 6''
28.	Hard slate, ...	25' to 0'' 652' 6''	17' 8'' to 494' 2''
29.	Mammoth bed. Dip 40° N., ...	55' 3'' to 707' 9''	40' 5'' to 534' 7''

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Draper colliery, tunnel from Primrose to Mammoth bed, second lift of slope.

Oliver Ditson.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	PRIMROSE BED, . .	10' 11'' to 10' 11''	8' 0'' to 8' 0''
2.	Black slate, ...	2' 0'' to 12' 11''	1' 6'' to 9' 6''

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
3.	Sandstone, ...	40 0″ to 52′ 11″	29′ 3″ to 38′ 9″
4.	Strata, ...	26′ 6″ to 79′ 5″	19′ 4″ to 58′ 1″
5.	COAL, ...	3′ 6″ to 82′ 11″	2′ 7′ to 60′ 8″
6.	Slate, ...	4′ 3″ to 87′ 2″	3′ 1″ to 63′ 9″
7.	Strata, ...	2′ 0″ to 89′ 2″	1′ 4″ to 65′ 1″
8.	Slate, ...	3′ 0″ to 92′ 2″	2′ 2″ to 67′ 3″
9.	Iron balls, ...	6″ to 92′ 8″	4″ to 67′ 7″
10.	Strata, ...	5′ 0″ to 97′ 8″	3′ 9″ to 71′ 4″
11.	Slate, ...	13′ 0″ to 110′ 8″	10′ 0″ to 81′ 4″
12.	Sandstone, ...	7′ 0′ to 117′ 8″	5′ 4″ to 86′ 8″
13.	COAL, ...	6″ to 118′ 2″	4″ to 87′ 0″
14.	Slate, ...	6″ to 118′ 8″	5″ to 87′ 5″
15.	Sandstone, ...	107′ 6″ to 226′ 2″	79′ 11″ to 167′ 4″
16.	Slate, ...	41′ 6″ to 267′ 8″	30′ 10″ to 198′ 2″
17.	MAMMOTH BED, . .	53′ 8″ to 321′ 6′	40′ 0′ to 238′ 2″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Draper colliery, tunnel from Mammoth to Buck Mountain bed on 2d lift of slope.

Oliver Ditson.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED. Dip 47° N., . . .	55′ 3″ to 55′ 3″	40′ 5″ to 40′ 5″
2.	Slate, ...	14′ 0″ to 69′ 3″	10 3′ to 50′ 8″
3.	COAL, ...	1′ 0″ to 70′ 3″	9″ to 51′ 5″
4.	Slate, ...	4′ 0″ to 74′ 3″	3′ 0″ to 54′ 5″
5.	SKIDMORE BED, .	2′ 5″ to 76′ 8″	1′ 10″ to 56′ 3″
6.	Slate, ...	4′ 7″ to 81′ 3″	3′ 6″ to 59′ 9″
7.	Close and fine SS.,	42′ 0″ to 123′ 9″	32′ 1″ to 91′ 10″
8.	SEVEN-FOOT BED. Dip 51° N., . . .	5′ 0″ to 128′ 9″	3′ 10″ to 95′ 8″
9.	Slate, ...	1′ 11″ to 130′ 8″	1 6″ to 97′ 2″
10.	Fine conglomerate,	79′ 1″ to 209′ 9″	61′ 5″ to 158′ 7′
11.	Slate, ...	1′ 0″ to 210′ 9″	9″ to 159′ 4″
12.	Coarse cong , . . .	11′ 0″ to 221′ 9″	8′ 7″ to 167′ 11″
13.	Slate, ...	27′ 0″ to 248′ 9″	21′ 0″ to 188′ 11″
14.	BUCK MOUNTAIN BED. Dip 52° N.,	10′ 2″ to 258′ 11″	8′ 0″ to 196′ 11′

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Draper colliery, tunnel from Mammoth bed to Skidmore bed at stable 2d lift of slope.

Oliver Ditson.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, . .	53′ 8″ to 53′ 8″	38′ 7″ to 38 7″
2.	Slate, ...	24′ 0″ to 77′ 8″	17′ 3″ to 55′ 10″
3.	COAL, ...	1′ 3″ to 78′ 11″	11″ to 56′ 9″
4.	Slate, ...	2′ 2″ to 81′ 1″	2′ 0″ to 58′ 9″
5.	COAL, ...	10″ to 81′ 11″	7″ to 59′ 4″
6.	Slate bone and COAL,	2′ 1″ to 84′ 0″	1 6″ to 60′ 10″
7.	COAL, ...	2′ 6″ to 86′ 6,′	1′ 9″ to 62′ 7″
8.	Slate, ...	14′ 3′ to 100 9″	14′ 3″ to 76′ 10″
9.	SEVEN-FOOT BED, . .	8′ 7″ to 109′ 4″	6′ 3′ to 83′ 1″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Boston Run colliery, tunnel from Mammoth to Buck Mountain bed, 2d lift of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, BOTTOM SPLIT. Dip 54½° N., . .	27′ 4″ to 27′ 4″	22′ 3″ to 22′ 3″
2.	Hard slate, . . .	25′ 0″ to 52′ 4″	19′ 10″ to 42′ 1″
3.	COAL. Dip 50½°, .	1′ 0″ to 53′ 4″	9″ to 42′ 10″
4.	Sandstone, . . .	1′ 6″ to 54′ 10″	1′ 2″ to 44′ 0″
5.	COAL. Dip 50½°, .	1′ 7″ to 56′ 5″	1′ 2″ to 45′ 2″
6.	Slate, ...	9″ to 57′ 2″	7″ to 45′ 9″
7.	COAL. Dip 53½°, .	1′ 11″ to 59′ 1″	1′ 6″ to 47′ 3″
8.	Slate, ...	9′ 6″ to 68′ 7″	7′ 8″ to 54′ 11″
9.	Sandstone, . . .	11′ 0″ to 79′ 7′	8′ 10″ to 63′ 9″
10.	Hard gray SS., .	13′ 0″ to 92′ 7″	10′ 5″ to 74 2″
11.	Fine cong., . . .	22′ 3″ to 114′ 10″	17′ 10″ to 92′ 0″
12.	Hard slate, sulphur and COAL mixed, ...	3″ to 115′ 1″	3″ to 92′ 3″
13.	Fine cong., . . .	13′ 2″ to 128′ 3″	10′ 10″ to 103′ 1′
14.	Slate, ...	1″ to 128′ 4″	1″ to 103′ 2′
15.	Fine cong., . . .	10″ to 129′ 2″	9″ to 103′ 11′
16.	Hard slate and sulphur, . . .	4″ to 129′ 6″	4″ to 104′ 3″
17.	Fine conglomerate. Dip 55½°, .	5′ 10″ to 135′ 4″	4′ 10″ to 109′ 1″
18.	SEVEN-FOOT BED,	16′ 9″ to 152′ 1″	13′ 10″ to 122′ 11″

No. of strata.	*Description.*	*Thicknesses measured vertically.*	*Thicknesses perpendicular to dip.*
19.	Slate, ...	20' 6" to 172' 7"	16' 10" to 139' 9"
20.	Hard gray SS., .	8" to 173' 3"	6" to 140' 3"
21.	Coal. Dip 54° N.,	8" to 173' 11"	6" to 140' 9"
22.	Slate, ...	5' 9" to 179' 8"	4' 8" to 145' 5"
23.	Hard sandstone,	2' 5" to 182' 1"	1' 11" to 147' 4"
24.	Coal. Dip 52° N.,	1' 4" to 183' 5"	1' 1" to 148' 5"
25.	Hard gray SS., .	5' 5" to 188' 10"	4' 3" to 152' 8"
26.	Slate, ...	3' 7" to 192' 5'	2' 0" to 154' 8"
27.	Hard slate, . . .	6' 10" to 199' 3"	5' 6" to 160' 2"
28.	Buck Mountain bed. Dip 55° N.,	11' 4" to 210' 7'	9' 4" to 169' 6"

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Boston Run colliery, section from Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Mammoth bed, ...	32' 1" to 32' 1"
2.	Strata, ...	12' 9" to 44' 10"
3.	Coal, } Skidmore bed.	6" to 45' 4"
4.	Slate,	3' 2" to 48' 6"
5.	Coal,	2' 8" to 51' 2"
6.	Strata, ...	48' 2" to 99' 4"
7.	Seven-foot bed, ...	9' 6" to 108' 10"
8.	Slate, ...	9' 7" to 118' 5"
9.	Coal, ...	9" to 119' 2"
10.	Rock and slate, ...	12' 9" to 131' 11"
11.	Coal, ...	9" to 132' 8"
12.	Slate, ...	9' 7" to 142' 3'
13.	Buck Mountain bed, ...	9' 7" to 151' 10"

See Columnar section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Boston Run colliery, Pott Run tunnel from Mammoth bed to conglomerate.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Mammoth bed, ...	25' 0" to 25' 0"
2.	Wash, ...	24' 4" to 49' 4"
3.	Sandstone and slate, ...	22' 8" to 72' 0"

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
4.	Slate,	8′ 0″ to 80′ 0″
5.	SKIDMORE BED,	3′ 0″ to 83′ 0″
6.	Slate,	14′ 0″ to 97′ 0″
7.	COAL,	1′ 0″ to 98′ 0″
8.	Slate,	7′ 0″ to 105′ 0″
9.	Sandstone,	9′ 0″ to 114′ 0″
10.	Conglomerate,	21′ 0″ to 135′ 0″
11.	SEVEN-FOOT BED,	8′ 5″ to 143′ 5″
12.	Slate,	8′ 7″ to 152′ 0″
13.	Sandstone,	24′ 0″ to 176′ 0″
14.	Conglomerate,	5′ 0″ to 181′ 0″
15.	Sandstone,	4′ 0″ to 185′ 0″
16.	COAL,	5′ 6″ to 190′ 6″
17.	Slate, } BUCK MOUNTAIN BED.	4′ 6″ to 195′ 0″
18.	COAL,	2′ 6″ to 197′ 6″
19.	Slate,	8′ 6″ to 206′ 0″
20.	Conglomerate,	70′ 0″ to 276′ 0″
21.	Slate,	3′ 0″ to 279′ 0″
22.	Conglomerate,	16′ 0″ to 295′ 0″
23.	Slate,	4′ 0″ to 299′ 0″
24.	Conglomerate,	9′ 6″ to 308′ 6″
25.	Slate,	1 6″ to 310′ 0″
26.	Conglomerate,	17′ 6″ to 327′ 6″
27.	Seam.	
28.	Conglomerate,	87′ 0″ to 414′ 6″
29.	Slate,	1′ 0′ to 415′ 6″
30.	Conglomerate,	18′ 0″ to 433′ 6″
31.	Slate,	1′ 0′ to 434′ 6″
32.	Conglomerate,	18′ 0″ to 452′ 6″
33.	Seam.	
34.	Conglomerate,	37′ 6″ to 490′ 0′
35.	Conglomerate,	38′ 0″ to 528′ 0″
36.	Conglomerate,	8′ 6″ to 536′ 6″
37.	Traces of COAL.	

See Columnar section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

St. Nicholas colliery, inside tunnel from Holmes bed to Buck Mountain bed, 1st lift, east gangway.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	HOLMES BED,	10′ 0″ to 10′ 0″
2.	Rock,	180′ 0″ to 190′ 0″
3.	MAMMOTH BED (top split),	18′ 0″ to 208′ 0″
4.	Slate,	10′ 0″ to 218′ 0″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
5.	Sandstone,	20′ 0″ to 238′ 0″
6.	MAMMOTH BED (middle split),	13′ 0″ to 251′ 0″
7.	Sandstone,	60′ 0″ to 311′ 0″
8.	MAMMOTH BED (bottom split),	13′ 3″ to 324′ 3″
9.	Slate,	3′ 9″ to 328′ 0″
10.	Rock,	28′ 0″ to 356′ 0″
11.	Slate,	1′ 5″ to 357′ 5″
12.	SKIDMORE BED,	3′ 7″ to 361′ 0″
13.	Slate,	4′ 3″ to 365′ 3″
14.	Rock,	2′ 1″ to 367′ 4″
15.	Slate,	5′ 8″ to 373′ 0″
16.	SEVEN-FOOT BED,	7″ to 373′ 7″
17.	Gritty slate,	5′ 8″ to 379′ 3″
18.	Slate,	6′ 11″ to 386′ 2″
19.	Rock,	9′ 11″ to 396′ 1″
20.	Lithographic rock,	13′ 2″ to 409′ 3″
21.	Slate,	7′ 2″ to 416′ 5″
22.	Rock,	1′ 3″ to 417′ 8″
23.	Slate,	1′ 3″ to 418′ 11″
24.	Rock,	15′ 7″ to 434′ 6″
25.	Slate,	2′ 1″ to 436′ 7″
26.	Sandstone,	5′ 11″ to 442′ 6″
27.	Slate,	1′ 6″ to 444′ 0″
28.	COAL,	6″ to 444′ 6″
29.	Slate,	1′ 6″ to 446′ 0″
30.	COAL,	3′ 0″ to 449′ 0″
31.	Slate,	7′ 1″ to 456′ 1″
32.	BUCK MOUNTAIN BED,	9′ 6″ to 465′ 7″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Bear Run colliery, 1st lift tunnel from Seven-foot to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	SEVEN-FOOT BED. Dip 33½° S.		
2.	Slate,	33′ 0″ to 33′ 0″	18′ 2″ to 18′ 2′
3.	Sandstone,	13′ 2″ to 46′ 2″	7′ 3″ to 25′ 5″
4.	Conglomerate,	8′ 8″ to 54′ 10″	4′ 3″ to 29′ 8″
5.	COAL. Dip 32° S.,	1′ 2″ to 56′ 0″	7″ to 30′ 3″
6.	Hard slate,	10′ to 56′ 10″	5″ to 30′ 8″
7.	COAL,	1″ to 56′ 11″	1″ to 30′ 9″
8.	Hard, coarse cong.,	12′ 1″ to 69′ 0″	6′ 5″ to 37′ 2″
9.	COAL. Dip 32° S.,	1′ 10″ to 70′ 10″	1′ 0″ to 38′ 2″

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
10.	Black slate, ...	11′ 2″ to 82′ 0″	5′ 9″ to 43′ 11″
11.	Soft slate, ...	1′ 8″ to 83′ .8″	10″ to 44′ 9″
12.	**BUCK MOUNTAIN BED.** Dip 29° S.,	27′ 2″ to 110′ 10″	13′ 2″ to 57′ 11″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Bear Run colliery, tunnel from Mammoth to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	**MAMMOTH BED.** Dip 35° S., ...	35′ 0″ to 35′ 0″	20′ 9″ to 20′ 9″
2.	Slate, ...	14′ 0″ to 49′ 0″	8′ 5″ to 29′ 2″
3.	Sandstone, ...	20′ 0″ to 69′ 0″	11 11″ to 41′ 1″
4.	Slate, ...	13′ 0″ to 82′ 0″	7′ 8″ to 48′ 9″
5.	**COAL,**	1′ 0″ to 83′ 0″	7″ to 49′ 4″
6.	Slate, ...	5′ 0″ to 88′ 0″	3′ 9″ to 53′ 1″
7.	**SKIDMORE BED,** . .	15′ 0″ to 103′ 0″	9′ 0″ to 62′ 1″
8.	Soft slate, ...	11′ 0′ to 114′ 0″	5′ 6″ to 67′ 7″
9.	**COAL,**	1′ 5″ to 115′ 5″	9″ to 68′ 4″
16.	Slate with iron ore balls, ...	44′ 0″ to 159′ 5″	14′ 0″ to 82′ 4″
11.	Slate, ...	11′ 5′ to 170′ 10″	2′ 6″ to 84′. 10′
12.	**SEVEN-FOOT BED,** .	28′ 0″ to 198′ 10″	8′ 6″ to 93′ 4′
13.	Slate, ...	6′ 5″ to 205′ 3″	2′ 0″ to 95′ 4″
14.	**COAL,**	2′ 0″ to 207′ 3″	1′ 0″ to 96′ 4″
15.	Slate with iron ore balls, ...	68′ 0″ to 275′ 3″	28′ 6″ to 124′ 10″
16.	**COAL,**	1′ 0″ to 276′ 3″	6″ to 125′ 4″
17.	Soft slate, ...	7′ 0″ to 283′ 3″	3′ 6″ to 128′ 10″
18.	Sandstone, ...	31′ 9″ to 315′ 0″	13′ 8″ to 142′ 6″
19.	Slate, ...	1′ 6″ to 316′ 6″	10″ to 143′ 4″
20.	**COAL,**	1′ 3″ to 317′ 9′	6″ to 143′ 10′
21.	Slate, ...	3′ 6″ to 321′ 3″	1′ 6″ to 145′ 4″
22.	**COAL,**	1′ 0″ to 322′ 3″	6″ to 145′ 10″
23.	Slate, ...	20 0″ to 342′ 3″	9′ 0″ to 154′ 10″
24.	Hard gray SS., . . .	8′ 5″ to 350′ 8″	3′ 4″ to 158′ 2″
25,	**BUCK MOUNTAIN BED.** Dip 25° S.,	23′ 0″ to 373′ 8″	9′ 10″ to 168′ 0″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Bear Run colliery, tunnel from Holmes bed to Mammoth bed. 2d lift of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	HOLMES BED,	9′ 0″ to 9′ 0″
2.	Soft rock and slate,	34′ 0″ to 43′ 0″
3.	COAL,	2′ 9″ to 45′ 9″
4.	Slate,	11′ 0″ to 56′ 9″
5.	COAL,	2′ 0″ to 58′ 9″
6.	Soft rock and slate,	64′ 0″ to 122′ 9″
7.	Rock,	74′ 0″ to 196′ 9″
8.	Slate,	6′ 0″ to 202′ 9″
9.	MAMMOTH BED (top split),	13′ 9″ to 216′ 6″
10.	Hard rock,	71′ 0″ to 287′ 6″
11.	MAMMOTH BED (middle split),	9′ 0″ to 296′ 6″
12.	Slate,	2′ 6″ to 299′ 0″
13.	MAMMOTH BED (bottom split),	14′ 0″ to 313′ 0″

See Columnar Section Sheet No. VI and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Part II.

Tunnel Ridge colliery, tunnel from Mammoth to Buck Mountain bed, 1st lift of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, BOTTOM SPLIT. Dip 57° N.,	19′ 0″ to 19′ 0″	15′ 9″ to 15′ 9″
2.	Slate,	1′ 0″ to 20′ 0″	10″ to 16′ 7″
3.	Sandstone,	27′ 0″ to 47′ 0″	22′ 5″ to 39′ 0″
4.	Sandstone and slate,	12′ 0″ to 59′ 0″	10′ 0″ to 49′ 0″
5.	SKIDMORE BED,	4′ 0″ to 63′ 0″	3′ 4″ to 52′ 4″
6.	Slate,	3′ 6″ to 66′ 6″	2′ 11″ to 55′ 3″
7.	Sandstone,	48′ 0″ to 114′ 6″	39′ 10″ to 95′ 1″
8.	SEVEN-FOOT BED. Dip 55° N.,	9′ 0″ to 123′ 6″	7′ 6″ to 102′ 7″
9.	Sandstone and slate,	24′ 6″ to 148′ 0″	20′ 4″ to 122′ 11″
10.	COAL,	1′ 0″ to 149′ 0″	10″ to 123′ 9″
11.	Slate,	6′ 0″ to 155′ 0″	5′ 0″ to 128′ 9″
12.	Sandstone,	56′ 6″ to 205′ 6″	41′ 11″ to 170′ 8″
13.	COAL,	1′ 6″ to 207′ 0″	1′ 3″ to 171′ 11″
14.	Slate,	9′ 6″ to 216′ 6″	7′ 11″ to 179′ 10″
15.	BUCK MOUNTAIN BED. Dip 55° N.,	17′ 0″ to 233′ 6″	14′ 1″ to 193′ 11″

See Columnar Section Sheet No. VII and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Elmwood colliery, tunnel from Mammoth to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED** (top split),	5' 0'' to 5' 0''
2.	Rock,	25' 0'' to 30' 0''
3.	**MAMMOTH BED** (middle split),	3' 5' to 33' 5''
4.	Slate,	5' 2'' to 38' 7''
5.	Sandstone,	3' 6'' to 42' 1''
6.	Slate,	11' 2'' to 53' 3''
7.	**MAMMOTH BED** (bottom split),	15' 6'' to 68' 9''
8.	Slate,	5' 0'' to 73' 9''
9.	**SKIDMORE BED,**	7' 6'' to 81' 3''
10.	Slate,	7' 6'' to 88' 9''
11.	Sandstone,	34' 6'' to 123' 3''
12.	**SEVEN-FOOT BED,**	10' 6'' to 133' 9''
13.	Slate,	8' 0'' to 141' 9''
14.	Gray rock,	42' 6'' to 184' 3''
15.	**COAL BED,**	4' 0'' to 188' 3''
16.	Slate,	3' 6'' to 191' 9''
17.	**BUCK MOUNTAIN BED,**	17' 0'' to 208' 9''

See Columnar Section Sheet No. VII and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Mahanoy City colliery, tunnel from Orchard bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*		*Thicknesses perpendicular to dip.*
1.	**COAL,**	**ORCHARD BED,**	3' 5' to 3' 5''
2.	Slate,		3' 5'' to 6' 10''
3.	**COAL,**		7' 4'' to 14' 2''
4.	Slate,		13' 3'' to 27' 5''
5.	Rock,		22' 10'' to 50' 3''
6.	Slate and iron ore balls,		10' 0'' to 60' 3''
7.	Rock,		5' 4'' to 65' 7''
8.	Slate and iron ore,		19' 2'' to 84' 9''
9.	Rock,		23' 8'' to 108' 5''
10.	Slate,		2' 11'' to 111' 4''
11.	Dirt (?)		4' 1'' to 115' 5''
12.	Slate,		4' 6'' to 119 11''
13.	Rock,		9' 3'' to 129' 2''
14.	**COAL,**	**PRIMROSE BED,**	2' 6'' to 131' 8''
15.	Slate,		2' 3'' to 133' 11''
16.	**COAL,**		3' 5'' to 137' 4''

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
17.	Slate,	25′ 0″ to 162′ 4″
18.	COAL,	2′ 6″ to 164′ 10″
19.	Slate and iron ore balls,	3′ 11″ to 168′ 9″
20.	Rock,	1′ 5′ to 170′ 2′
21.	Slate with iron ore balls,	5′ 4″ to 175′ 6″
22.	Rock,	2′ 4″ to 177′ 10′
23.	Slate and iron ore balls,	8′ 10″ to 186′ 8″
24.	Rock,	7′ 9″ to 194′ 5″
25.	Sandy slate,	2′ 11″ to 197′ 4″
26.	Slate and iron balls,	17′ 1″ to 214′ 5″
27.	Rock,	4′ 0″ to 218′ 5″
28.	Slate and iron ore balls,	3′ 0″ to 221′ 5″
29.	Sandstone,	2′ 3″ to 223′ 8″
30.	Black slate,	3′ 3″ to 226′ 11″
31.	Sandy slate,	2′ 8″ to 229′ 7″
32.	Rock,	5′ 0″ to 234′ 7″
33.	Slate,	2 0″ to 236′ 7″
34.	Rock,	2′ 1″ to 238 8″
35.	Slate and iron ore balls,	26′ 9″ to 265′ 5″
36.	HOLMES BED,	14′ 0″ to 279′ 5″
37.	Rock,	160′ 0″ to 439′ 5″
38.	MAMMOTH BED (top split),	25′ 0″ to 464′ 5″
39.	Rock,	45′ 0″ to 509′ 5″
40.	MAMMOTH BED (middle split),	6′ 0″ to 515′ 5″
41.	Rock,	100′ 0″ to 615, 5″
42.	MAMMOTH BED (bottom split),	10′ 0″ to 625′ 5″

See Columnar Section Sheet No. VII and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Mahanoy City colliery, tunnel from Holmes bed to Mammoth bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	HOLMES BED.	
2.	Slate,	11′ 0″ to 11′ 0″
3.	Sandstone,	15′ 0″ to 26′ 0″
4.	Slate,	13′ 0″ to 39′ 0′
5.	Sandstone,	29′ 0″ to 68′ 0″
6.	Fine conglomerate,	23′ 0″ to 91′ 0″
7.	Sandstone,	9′ 0″ to 100′ 0″
8.	Slate,	9′ 6″ to 109′ 6″
9.	Sandstone,	35′ 6″ to 145′ 0″
10.	Slate,	20′ 0″ to 165′ 0″
11.	MAMMOTH BED (top split),	23′ 0″ to 188′ 0″

See Columnar Section Sheet No. VII and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Mahanoy City colliery, tunnel from Mammoth to Buck Mountain bed, 2d lift of slope.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	**MAMMOTH BED**, upper split. Dip 30° S.,	36' 6'' to 36' 6''	18' 3'' to 18' 3''
2.	Slate,	35' 4'' to 71' 10''	17' 6'' to 35' 9''
3.	**MAMMOTH BED**, middle split. Dip 29° S.,	8' 8'' to 80' 6''	4' 10'' to 40' 7''
4.	Hard sandstone,	92' 8'' to 173' 2''	48' 4'' to 88' 11''
5.	Slate,	5' 11'' to 179' 1''	3' 3'' to 92' 2''
6.	Hard sandstone,	67' 10'' to 246' 11''	39' 5'' to 131' 7''
7.	**MAMMOTH BED**, lower split. Dip 38° S.,	25' 5'' to 272' 4''	15' 7'' to 147' 2''
8.	Slate,	2' 8'' to 275' 0''	1' 7'' to 148' 9''
9.	Sandstone,	18' 9'' to 293' 9''	11' 6'' to 160' 3''
10.	**COAL**. Dip 39°,	1' 9'' to 295 6''	1' 1'' to 161' 4''
11.	Slate,	6' 6'' to 302' 0''	3' 7'' to 164' 11''
12.	**SKIDMORE BED**. Dip 30° S.,	10' 6'' to 312' 6''	5' 3'' to 170' 2''
13.	Sandstone,	43' 4'' to 355' 10''	21' 8'' to 191' 10''
14.	**COAL**,	1' 5'' to 357' 3''	8'' to 192' 6''
15.	Slaty sandstone,	35' 3'' to 392' 6''	17' 7' to 210' 1'
16.	Sandy slate,	13' 10'' to 406' 4''	6' 10'' to 216' 11''
17.	**SEVEN-FOOT BED**. Dip 29°,	21' 9'' to 428' 1''	10' 5'' to 227' 4''
18.	Slate,	16' 5'' to 444' 6''	8' 11'' to 236' 3''
19.	**COAL**,	6' 3'' to 450' 9'	3' 1'' to 239' 4''
20.	Hard slate,	13' 6'' to 464' 3''	6' 8'' to 246' 0''
21.	**COAL**,	2' 0'' to 466' 3''	1' 0'' to 247' 0''
22.	Slate,	11' 3'' to 477' 6''	5' 7'' to 252' 7''
23.	**BUCK MOUNTAIN BED**. Dip 31° S.,	21' 4'' to 498' 10''	10' 11'' to 263' 6''

See Columnar Section Sheet No. VII and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

North Star colliery, tunnel from Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED (top split),	3' 6'' to 3' 6''
2.	Slate,	5' 0'' to 8' 6''
3.	Sandstone,	65' 0'' to 73' 6''
4.	MAMMOTH BED (bottom split),	6' 0'' to 79' 6''
5.	Slate,	6' 0'' to 85' 6''
6.	Sandstone,	60' 0'' to 145' 6''
7.	SKIDMORE BED,	8' 6'' to 154' 0''
8.	Slate,	5' 0'' to 159' 0''
9.	Sandstone,	1' 0'' to 160' 0''
10.	Slate,	13' 0'' to 173' 0''
11.	Sandstone,	3' 6'' to 176' 6''
12.	Slate,	11' 0'' to 187' 6''
13.	COAL,	1' 6'' to 189' 0''
14.	Slate,	12' 6'' to 201' 6''
15.	SEVEN-FOOT BED,	7' 0'' to 208' 6''
16.	Slate,	5' 0'' to 213' 6''
17.	Conglomerate,	7' 0'' to 220 6''
18.	Sandstone,	27' 0'' to 247' 6''
19.	COAL (leader),	3' 0'' to 250' 6''
20.	Slate,	8' 0'' to 258' 6''
21.	BUCK MOUNTAIN BED,	15' 0'' to 273' 6''

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Parts I and II.

Staffordshire colliery, tunnel from Diamond to Orchard bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	DIAMOND BED. Dip 37°,	8' 6'' to 8' 6''
2.	Slate,	58' 0'' to 66' 6''
3.	Sandstone,	31' 0'' to 97' 6''
4.	COAL,	1' 2'' to 98' 8''
5.	Sandstone,	21' 6'' to 120' 2''
6.	ORCHARD BED. Dip 34°,	7' 6'' to 127' 8''

See Columnar Section Sheet No. VII and Mine Sheet No. II, Atlas Western Middle Anthracite Field, Parts I and II.

Webster colliery, section of tunnels.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	SKIDMORE BED,	8′ 0″ to 8′ 0″
2.	Slate,	6′ 0″ to 14′ 0″
3.	Sandstone,	2′ 0″ to 16′ 0″
4.	Slate,	21′ 0″ to 37′ 0″
5.	Sandstone,	4′ 0″ to 41′ 0″
6.	Slate,	12′ 0″ to 53′ 0″
7.	COAL,	1′ 0″ to 54′ 0″
8.	Slate,	20′ 0″ to 74′ 0″
9.	SEVEN-FOOT BED,	5′ 0″ to 79′ 0″
10.	Sandstone and conglomerate,	40′ 0″ to 119′ 0″
11.	COAL BED,	4′ 0″ to 123′ 0″
12.	Slate,	4′ 0″ to 127′ 0″
13.	BUCK MOUNTAIN BED,	17′ 0″ to 144′ 0″

See Columnar Section Sheet No. VII and Mine Sheet No. 1, Atlas Western Middle Anthracite Field, Parts I and II.

Oak Hollow colliery, tunnel from surface to Buck Mountain bed.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Earth, gravel and sandstone,	60′ 0″ to 60′ 0″
2.	Slate,	2′ 0″ to 62′ 0″
3.	Blue sandstone, hard,	45′ 0″ to 107′ 0″
4.	MAMMOTH BED,	6′ 6″ to 113′ 6″
5.	Slate,	1′ 4″ to 114′ 10″
6.	Shelly sandstone, soft,	3′ 6″ to 118′ 4″
7.	Gray sandstone, hard,	42′ 0″ to 160′ 4″
8.	Conglomerate,	7′ 0″ to 167′ 4″
9.	Blue sandstone, hard,	4′ 6″ to 171′ 10″
10.	Conglomerate,	1′ 4″ to 173′ 2″
11.	Slate,	1′ 7″ to 174′ 9″
12.	SKIDMORE BED,	5′ 6″ to 180′ 3″
13.	Slate,	6′ 6″ to 186′ 9″
14.	Slaty sandstone,	2′ 0″ to 188′ 9″
15.	Slate,	6′ 4″ to 195′ 1″
16.	COAL,	6″ to 195′ 7″
17.	Slaty sandstone,	3′ 4″ to 198′ 11″
18.	Sandstone,	24′ 6″ to 223′ 5″
19.	SEVEN-FOOT BED,	4′ 6″ to 227′ 11″
20.	Sandstone,	9′ 0″ to 236′ 11″
21.	Slate,	9″ to 237′ 8″
22.	Blue sandstone, dark,	12′ 0″ to 249′ 8″

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
23.	Conglomerate,	9′ 0″ to 258′ 8″
24.	COAL and slate,	9″ to 259′ 5″
25.	Conglomerate,	8′ 3″ to 267′ 8″
26.	Slate,	2′ 4″ to 270′ 0″
27.	COAL,	7″ to 270′ 7″
28.	Slate,	1′ 6″ to 272′ 1″
29.	Gray slate, dark,	11′ 0″ to 283′ 1″
30.	COAL,	1′ 2″ to 284′ 3″
31.	Slate,	2′ 2″ to 286′ 5″
32.	Slaty sandstone,	7′ 0″ to 293′ 5″
33.	Sandstone,	14′ 4″ to 307′ 9″
34.	Slate,	1′ 3″ to 309′ 0″
35.	BUCK MOUNTAIN BED,	12′ 6″ to 321′ 6″

See Columnar Section Sheet No. VII and Mine Sheet No. IV, Atlas Western Middle Anthracite Field, Parts I and II.

Glendon colliery, tunnel from Ten-foot bed to Skidmore bed, and from Skidmore to Buck Mountain bed, east side main slope.

J. C. Haydon & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	TEN-FOOT BED. Dip 20° S.,	17′ 3″ to 17′ 3″	5′ 11″ to 5′ 11″
2.	Hard black slate,	4′ 3″ to 21′ 6″	1′ 5″ to 7′ 4″
3.	Hard gray SS.,	60′ 4″ to 81′ 10″	25′ 5″ to 32′ 9″
4.	Hard slate,	1′ 2″ to 83′ 0″	6″ to 33′ 3″
5.	Hard gray SS.,	17′ 11″ to 100′ 11″	7′ 7″ to 40′ 10″
6.	Hard sand slate,	1′ 7″ to 102′ 6″	8″ to 41′ 6″
7.	Gray sandstone,	136′ 7′ to 239′ 1″	68′ 3″ to 109′ 9″
8.	SKIDMORE BED. Dip 30°,	14′ 2′ to 253′ 3″	7′ 1″ to 116′ 10″
9.	Sandstone, Dip 33° S.,	13′ 10″ to 267′ 1″	7′ 7″ to 124′ 5″
10.	Hard black slate,	1′ 9″ to 268′ 10″	11″ to 125′ 4″
11.	Sandstone,	12′ 5″ to 281′ 3″	6′ 9″ to 132′ 1″
12.	Slate. Dip 32½ S.,	1′ 10″ to 283′ 1″	1′ 0″ to 133′ 1″
13.	Slate and bone,	8″ to 283′ 9″	6″ to 133′ 7″
14.	Black slate, with streaks of sand slate and iron balls,	17′ 6″ to 301′ 3″	8′ 5″ to 142′ 0″
15.	SEVEN-FOOT BED. Dip 26°–29° S.,	12′ 1″ to 313′ 4″	5′ 8″ to 147′ 8″

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
16.	Black slate, . . .	5' 6'' to 318' 10''	2' 8'' to 150' 4''
17.	Hard, fine, gray sandstone, . . .	144' 6'' to 463' 4''	69' 11'' to 220' 3'
18.	Hard black slate,	9' 4'' to 472' 8''	4 10'' to 225' 1''
19.	BUCK MOUNTAIN BED. Dip 31°.,	21' 4'' to 494' 0''	11' 0'' to 256' 1''

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Part II.

Glendon colliery, tunnel from the Four-foot to the Ten-foot bed and from the Ten-foot to the Seven-foot bed, 1st lift of slope.

J. C. Haydon & Co.

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
1.	FOUR-FOOT BED. Dip 32° S., . . .	11' 0'' to 11' 0''	5' 10'' to 5' 10''
2.	Soft black slate, .	15' 0'' to 26' 0''	7' 5'' to 13' 3''
3.	Fine gray SS., .	60' 0'' to 86' 0''	37' 5'' to 50' 8''
4.	TEN-FOOT BED, Dip 29° S., . .	10' 2'' to 96' 2''	4' 11'' to 55' 7''
5.	Hard black slate. Dip 37° S., . .	10' 0'' to 106' 2''	6' 0'' to 61' 7''
6.	Hard gray rock,	44' 0'' to 150' 2'	26 5'' to 88' 0''
7.	Slate. Dip 48° S.,	1'' to 150' 3''	1'' to 88' 1''
8.	Hard gray rock,	105' 5'' to 255' 8''	78' 4'' to 166' 5''
9.	SKIDMORE BED. Dip 50° S., . .	10' 5'' to 266 1''	8' 0'' to 174' 5''
10.	Soft black slate, .	6' 0'' to 272' 1''	4' 7'' to 179' 0''
11.	Slate and bone, .	11'' to 273' 0''	9'' to 179' 9''
12.	Soft black slate, .	6' 10'' to 279' 10''	5' 3'' to 185' 0''
13.	Dirty COAL, . . .	8'' to 280' 6''	6'' to 185' 6''
14.	Black slate, . . .	11' 4'' to 291' 10''	8' 8'' to 194' 2'
15.	Hard gray SS., .	29' 0'' to 320' 10''	23' 2'' to 217' 4''
16.	Hard black slate,	17' 11'' to 338' 9''	15' 2'' to 232' 6''
17.	SEVEN-FOOT BED. Dip 70° S., . .	6' 5'' to 345' 2''	6' 0'' to 238' 6''

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Part II.

Glendon colliery, tunnel from Seven-foot bed to Buck Mountain bed, east gangway, lower slope level.

J. C. Haydon & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	SEVEN-FOOT BED, Dip 34° S., . .	7′ 5″ to 7′ 5″	4′ 3″ to 4′ 3″
2.	Hard black slate,	8′ 6″ to 15′ 11″	4′ 9″ to 9′ 0′
3.	Hard gray sandstone (fine), .	52′ 6″ to 68′ 5″	35′ 9″ to 44′ 9″
4.	Black dirt (soft). Dip 51° S., . .	5′ 8″ to 74′ 1″	4′ 4″ to 49′ 1″
5.	Hard black slate,	11″ to 75′ 0″	8′ 6″ to 57′ 7″
6.	Sandy slate (bastard), ...	17′ 8″ to 92′ 8″	13′ 9″ to 71′ 4″
7.	Hard sandstone,	8′ 7″ to 101′ 3″	6′ 3″ to 77′ 7″
8.	Slate and bone, .	11″ to 102′ 2″	8″ to 78′ 3″
9.	Black slate (hard), ...	9′ 7″ to 111′ 9″	6′ 8″ to 84′ 11″
10.	COAL, slate and dirt. Dip 44° S.,	4′ 2″ to 115′ 11″	2′ 10″ to 87′ 9″
11.	Hard black slate,	5′ 2″ to 121′ 1″	3′ 7″ to 91′ 4″
12.	Sandstone, . . .	1′ 2″ to 122′ 3′	9″ to 92′ 1″
13.	Hard sand slate,	7″ to 122′ 10″	4″ to 92′ 5″
14.	Sandstone, . . .	47′ 11″ to 170′ 9″	31′ 5″ to 123′ 10′
15.	Black slate, . . .	2′ 0″ to 172′ 9″	1′ 3″ to 125′ 1″
16.	BUCK MOUNTAIN BED. Dip 37°–41°, ...	21′ 9″ to 194′ 6″	13′ 4″ to 138′ 5″

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Part II.

Hillside colliery, tunnel from bottom split of Mammoth bed to Buck Mountain bed.

P. & R. C. & I. Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	MAMMOTH BED, bottom split. Dip 40°, ...	9′ 10″ to 9′ 10″	6′ 4″ to 6′ 4″
2.	Sandstone, ...	153′ 0″ to 162′ 10″	91′ 11″ to 98′ 3″
3.	SKIDMORE BED. Dip 35°, ...	11′ 9″ to 174′ 7″	6′ 9″ to 105′ 0″
4.	Sulphur balls, . .	2′ 0″ to 176′ 7″	1′ 2″ to 106′ 2″

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
5.	Soft slate, ...		32' 0'' to 208' 7''	18' 4'' to 124' 6''
6.	COAL. Dip 35°, . .		1' 9'' to 210' 4''	1' 0'' to 125' 6''
7.	Slate, ...		21' 0'' to 231' 4''	12' 0'' to 137' 6''
8.	COAL, ...		3' 6'' to 234' 10''	2' 0'' to 139' 6''
9.	Slate, ...		3' 0'' to 237' 10''	1' 9'' to 141' 3''
10.	Sandy slate, . . .		12' 0'' to 249' 10''	6' 10'' to 148' 1''
11.	Sandstone, ...		31' 0'' to 280' 10''	17' 9'' to 165' 10''
12.	COAL, ...		1' 5'' to 282' 3''	9'' to 166' 7''
13.	Slate, ...		10' 0'' to 292' 3'	5' 2'' to 171' 9''
14.	Sandstone, ...		7' 0'' to 299' 3''	3' 8'' to 175' 5''
15.	Slate, ...		6' 6'' to 305' 9''	3' 4' to 178' 9''
16.	COAL,	BUCK MOUNTAIN BED.	5' 0'' to 310' 9''	2' 8'' to 181' 5''
17.	Bastard slate,		9' 0'' to 319' 9'	4' 3'' to 185' 8''
18.	COAL. Dip 28¾° S.,		3' 2'' to 322' 11''	1' 6'' to 187' 2''

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Part II.

Park No. 1 (Malvern) colliery, tunnel across basin from center of synclinal to Buck Mountain bed.

Lentz, Lilly & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
	Center of synclinal.		
1.	Hard gray sandstone. Dip 53° N. and 33½° S., . . .	10' 0'' to 10' 0''	7' 11'' to 7' 11''
2.	Slate, ...	27' 0'' to 37' 0''	21' 7'' to 29' 6''
3.	Hard sandstone, . .	13' 0'' to 50' 0''	10' 4'' to 39' 10''
4.	FOUR-FOOT BED. Dip 53° N., ...	6' 0'' to 56' 0''	4' 9'' to 44' 7''
5.	Slate, ...	7' 0'' to 63' 0''	5' 7'' to 50' 2''
6.	Dark sandstone, . .	7' 0'' to 70' 0''	5' 7'' to 55' 9'
7.	Slate, ...	30' 0'' to 100' 0''	27' 4'' to 83' 1''
8.	MAMMOTH BED. Dip 80° N., ...	16' 0'' to 116' 0''	15' 9'' to 98' 10''
9.	Slate, ...	4' 0'' to 120 0''	3' 11'' to 102' 9''
10.	Hard dark SS., . .	7' 0'' to 127' 0''	6' 10'' to 109' 7''
11.	Fine conglomerate,	24' 0'' to 151' 0''	23' 5'' to 133' 0''
12.	COAL, ...	1' 0'' to 152' 0''	11'' to 133' 11''
13.	Hard gray SS., . .	29' 0'' to 181' 0''	27' 7'' to 161' 6''
14.	Slate, ...	8' 0'' to 189' 0''	7' 8'' to 169' 2''

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
15.	Sandstone,	25′ 8″ to 214′ 8″	24′ 4″ to 193′ 6″
16.	COAL,	5″ to 215′ 1″	5″ to 193′ 11″
17.	Sandstone,	26′ 0″ to 241′ 1″	24′ 9″ to 218′ 8″
18.	Slate,	10′ 0″ to 251′ 1″	9′ 7″ to 228′ 3″
19.	TEN-FOOT BED. Dip 72° N.,	7′ 0″ to 258′ 1″	6′ 8″ to 234′ 11″
20.	Slate,	3′ 0″ to 261′ 1″	2′ 10″ to 237′ 9″
21.	Hard gray SS.,	75′ 0″ to 336′ 1″	68′ 5″ to 306′ 2″
22.	SKIDMORE BED. Dip 61° N.,	9′ 0″ to 345′ 1″	7′ 10″ to 314′ 0″
23.	Sandstone, mixed,	42′ 0″ to 387′ 1″	36′ 9″ to 350′ 9″
24.	Sandstone,	3′ 0″ to 390′ 1″	2′ 8″ to 353′ 5″
25.	Slate,	9′ 6″ to 399′ 7″	8′ 4″ to 361′ 9″
26.	SEVEN-FOOT BED. Dip 61° N.,	14′ 0″ to 413′ 7″	12′ 3″ to 374′ 0″
27.	Slate,	15′ 5″ to 429′ 0″	13′ 5″ to 387′ 5″
28.	Conglomerate,	2′ 0″ to 431′ 0″	1′ 9″ to 389′ 2″
29.	Slate,	2′ 0″ to 433′ 0″	1′ 9″ to 390′ 11″
30.	Gray sandstone,	2′ 0″ to 435′ 0″	1′ 9″ to 392′ 8″
31.	Slate,	15′ 6″ to 450′ 6″	13′ 6″ to 406′ 2″
32.	BUCK MOUNTAIN BED. Dip 61° N.,	11′ 6″ to 462′ 0″	11′ 9″ to 417′ 11″

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Part II.

Park No. 1 (Malvern) colliery. Water Level tunnel from surface to Buck Mountain bed.

Lentz, Lilly & Co.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	FOUR-FOOT BED.		
2.	Soft sandstone,	44′ 0″ to 44′ 0″	27′ 9″ to 27′ 9″
3.	TEN-FOOT BED. Dip 39° S.,	13′ 0″ to 57′ 0″	8′ 5″ to 36′ 2″
4.	Sandstone,	71′ 0″ to 128′ 0″	44′ 9″ to 80′ 11″
5.	Fine conglomerate,	17′ 0″ to 145′ 0″	10′ 9″ to 91′ 8″
6.	Trace of COAL.		
7.	Fine conglomerate,	127′ 0″ to 272′ 0″	80′ 0″ to 171′ 8″
8.	SKIDMORE BED. Dip 40° S.,	14′ 0″ to 286′ 0″	8′ 0″ to 179′ 8″
9.	Slate,	69′ 0″ to 355′ 0″	44′ 3″ to 223′ 11″
10.	SEVEN-FOOT BED. Dip 40° S.,	19′ 0″ to 374′ 0″	12′ 2″ to 236′ 1″
11.	Slate,	4′ 0″ to 378′ 0″	2 6″ to 238′ 7″

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
12.	Conglomerate and sandstone,	84′ 0″ to 462′ 0″	53′ 0″ to 291′ 7″
13.	Slate,	1′ 0″ to 463′ 0″	8″ to 292′ 3″
14.	COAL,	3′ 0″ to 466′ 0″	1′ 10″ to 294′ 1″
15.	Slate,	13′ 0″ to 479′ 0″	8′ 0″ to 302′ 1″
16.	BUCK MOUNTAIN BED. Dip 38° S.,	26′ 0″ to 505′ 0″	16′ 0″ to 318′ 1″

See Columnar Section Sheet No. VII and Mine Sheet No. 1, Atlas Western Middle Anthracite Field, Parts I and II.

Primrose colliery, tunnel from Holmes to Seven-foot bed.

Neville & Co.

No. of strata.	Description.	Thicknesses perpendicular to dip.
1.	HOLMES BED,	12′ 3″ to 12′ 3″
2.	Slate,	3′ 1″ to 15′ 4″
3.	Iron ore,	1′ 6″ to 16′ 10″
4.	Sandstone,	36′ 3″ to 53′ 1″
5.	Slate,	1′ 2″ to 54′ 3″
6.	Sandstone,	5′ 4″ to 59′ 7″
7.	Slate,	7′ 7″ to 67′ 2″
8.	Sandstone,	78′ 1″ to 145′ 3″
9.	MAMMOTH BED,	11′ 6″ to 156′ 9″
10.	Slate,	5′ 9″ to 162′ 6″
11.	Sandstone,	69′ 9″ to 232′ 3″
12.	Slate,	4′ 0″ to 236′ 3″
13.	FOUR-FOOT BED,	2′ 9″ to 239′ 0″
14.	Slate,	11′ 4″ to 250′ 4″
15.	Sandstone,	21′ 1″ to 271′ 5″
16.	TEN-FOOT BED,	5′ 0″ to 276′ 5″
17.	Sandy slate,	13′ 1″ to 289′ 6′
18.	Sandstone,	77′ 9″ to 367′ 3″
19.	SKIDMORE BED,	5′ 11″ to 373′ 2″
20.	Slate,	16′ 4″ to 389′ 6″
21.	Sandstone,	48′ 2″ to 437′ 8″
22.	Slate,	3′ 6″ to 441′ 2″
23.	SEVEN-FOOT BED,	2′ 8″ to 443′ 10″
24.	Slate,	7′ 11″ to 451′ 9″
25.	Sandstone,	15′ 4″ to 467′ 1″

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Parts I and II.

Morris colliery, tunnel from surface to Buck Mountain bed.

No. of strata.	*Description.*	*Thicknesses perpendicular to dip.*
1.	Sandstone,	21′ 0″ to 21′ 0″
2.	Soft red sandstone,	5′ 6″ to 26′ 6″
3.	MAMMOTH BED (top split),	2′ 2″ to 28′ 8″
4.	Sandy slate,	12′ 10″ to 41′ 6″
5.	Sandstone,	5″ to 41′ 11″
6.	Sand slate,	2′ 5″ to 44′ 4″
7.	Sandstone,	15′ 0″ to 59′ 4″
8.	Sandstone,	15′ 5″ to 74′ 9″
9.	Slate,	1′ 5″ to 76′ 2″
10.	MAMMOTH BED (bottom split),	7′ 4″ to 83′ 6″
11.	Fire clay,	5″ to 83′ 11″
12.	Slate,	1′ 5″ to 85′ 4″
13.	Sandstone,	5′ 8″ to 91′ 0″
14.	Coarse sandstone,	6′ 10″ to 97′ 10″
15.	Ochre,	6″ to 98′ 4″
16.	Hard sandstone,	1′ 2″ to 99′ 6″
17.	Soft red sandstone,	3′ 4″ to 102′ 10″
18.	Sandstone,	52′ 7″ to 155′ 5″
19.	Fine conglomerate,	6′ 7″ to 162′ 0″
20.	Sandstone,	10′ 7″ to 172′ 7″
21.	Slate,	4′ 2″ to 176′ 9″
22.	SKIDMORE BED,	4′ 4″ to 181′ 1″
23.	Slate,	8″ to 181′ 9″
24.	COAL,	8″ to 182′ 5″
25.	Slate,	19′ 0″ to 201′ 5″
26.	COAL,	10″ to 202′ 3″
27.	Slaty sandstone,	27′ 10″ to 230′ 1″
28.	SEVEN-FOOT BED,	2′ 11″ to 233′ 0″
29.	Slate,	8″ to 233′ 8″
30.	Slaty sandstone,	4′ 5″ to 238′ 1″
31.	Sandstone,	21′ 11″ to 260′ 0″
32.	Slate,	8″ to 260′ 8″
33.	Conglomerate,	25′ 2″ to 285′ 10″
34.	COAL,	10″ to 286′ 8″
35.	Rock,	10′ 2″ to 296′ 10″
36.	COAL.	1′ 7″ to 298′ 5″
37.	Sandstone,	5′ 1″ to 303′ 6″
38.	Conglomerate,	1′ 6″ to 305′ 0″
39.	Sandstone,	7′ 4″ to 312′ 4″
40.	Conglomerate,	38′ 0″ to 350′ 4″
41.	BUCK MOUNTAIN BED,	11′ 8″ to 362′ 0″

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Parts I and II.

Morris colliery, lower tunnel to Buck Mountain bed.

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Wash,		
2.	Gray sandstone, .	18′ 9″ to 18′ 9″	11′ 7″ to 11′ 7″
3.	Slate, ...	3′ 3″ to 22′ 0″	2′ 0″ to 13′ 7″
4.	TEN-FOOT BED. Dip 38°, ...	8′ 9″ to 30′ 9″	5′ 6″ to 19′ 1″
5.	Slate, ...	9′ 3″ to 40′ 0″	5′ 8″ to 24′ 9″
6.	Gray sandstone, .	25′ 0″ to 65′ 0″	15′ 9″ to 40′ 6″
7.	Conglomerate, . .	28′ 0″ to 93′ 0″	18′ 0″ to 58′ 6″
8.	Gray sandstone, .	15′ 0″ to 108′ 0″	9′ 8″ to 68′ 2″
9.	Conglomerate, . .	12′ 0″ to 120′ 0″	7′ 10″ to 76′ 0″
10.	Coarse sandstone, red and black, .	12′ 0″ to 132′ 0″	8′ 0″ to 84′ 0″
11.	Coarse cong., . . .	27′ 0″ to 159′ 0″	18′ 1″ to 102′ 1″
12.	Slate, ...	3′ 3″ to 162′ 3″	2′ 2″ to 104′ 3″
13.	COAL, } SKIDMORE BED. Dip 43°.	5′ 9″ to 168′ 0″	4′ 0″ to 108′ 3″
14.	Clod,	2′ 3″ to 170′ 3″	1′ 6″ to 109′ 9″
15.	COAL,	9″ to 171′ 0″	6″ to 110′ 3″
16.	Slate and slaty stone, ...	26′ 0″ to 197′ 0″	17′ 1″ to 127′ 4″
17.	COAL, ...	1′ 0″ to 198′ 0″	8″ to 128′ 0″
18.	Slate. Dip 39°, .	25′ 0″ to 223′ 0″	15′ 9″ to 143′ 9″
19.	Firm slaty stone, .	8′ 0″ to 231′ 0″	4′ 10″ to 148′ 7″
20.	Slate, ...	6′ 0″ to 237′ 0″	3′ 7″ to 152′ 2″
21.	SEVEN-FOOT BED. Dip 31°, ...	3′ 0″ to 240′ 0″	2′ 5″ to 154′ 7″
22.	Slate, ...	18′ 0″ to 258′ 0″	10′ 2″ to 164′ 9″
23.	Fine sandstone, .	7′ 0″ to 265′ 0″	4′ 7″ to 169′ 4″
24.	Fine cong., ...	55′ 11″ to 320′ 11″	39′ 7″ to 208′ 11′
25.	COAL, ...	1′ 1″ to 322′ 0″	10″ to 209′ 9″
26.	Slate. Dip 50°, . .	16′ 8″ to 338′ 8″	12′ 9″ to 222′ 6″
27.	COAL. Dip 50°, .	1′ 4″ to 340′ 0″	1′ 0″ to 223′ 6″
28.	Slate. Dip 50°, . .	19′ 0″ to 359′ 0″	14′ 7″ to 238′ 1″
29.	Slaty sandstone. Dip 43°, ...	19′ 0″ to 378′ 0″	13′ 0″ to 251′ 1″
30.	Dark gray SS., . .	31′ 0″ to 409′ 0″	22′ 0″ to 273′ 1″
31.	BUCK MOUNTAIN BED. Dip 47°,	19′ 0″ to 428′ 0″	13′ 10″ to 286′ 11″

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Parts I and II.

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Buck Mountain colliery, Water Level tunnel from surface to Buck Mountain bed.

Buck Mountain Coal Co.

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Wash, ...		68' 0'' to 68' 0''	68' 0'' to 68' 0''
2.	Sandstone, ...		11' 8'' to 79' 8''	4' 0'' to 72' 0''
3.	SS. with pebbles, . .		3' 6'' to 83' 2''	1' 3'' to 73' 3''
4.	COAL, ...		10'' to 84' 0''	4'' to 73' 7''
5.	Hard sandstone, . .		12' 9'' to 96' 9''	4' 4'' to 77' 11''
6.	COAL. Dip 20° N.,		7'' to 97' 4''	3'' to 78' 2''
7.	Sandstone, ...		43' 10'' to 141' 2''	14' 11'' to 93' 1''
8.	Fine conglomerate,		3' 7'' to 144' 9''	1' 6'' to 94' 7''
9.	COAL. Dip 25° N.,		2' 6'' to 147' 3''	1' 1'' to 95 8''
10.	Hard sandstone with small pebbles, . .		14' 6'' to 161' 9''	6' 2'' to 101' 10''
11.	Soft slate, ...		2' 1' to 163' 10''	10'' to 102' 8''
12.	Sandstone, ...		37' 9'' to 261' 7''	15' 11'' to 118' 7''
13.	Fine conglomerate,		7' 11'' to 209' 6''	3' 4'' to 121' 11''
14.	Sandstone, ...		38' 5'' to 247' 11''	16' 3'' to 138' 2''
15.	Slate.		33' 9'' to 281' 8''	16' 4'' to 154' 6''
16.	COAL. Dip 29° N.,		4' 10'' to 286' 6''	2' 4'' to 156' 10''
17.	Slate, ...		7' 8'' to 294' 2''	3' 9'' to 160' 7''
18.	Sandstone.		72' 8'' to 366' 10''	35' 3'' to 195' 10''
19.	Slate.		7' 5'' to 374' 3''	3' 3'' to 199' 1''
20.	COAL. Dip 25° N.,		1' 11'' to 376' 2''	10'' to 199' 11''
21.	Slate.		12' 1'' to 388' 3''	5' 4'' to 205' 3''
22.	COAL.		3' 1'' to 391' 4''	1' 10'' to 207' 1''
23.	Slate, ...		43' 2'' to 434' 6''	18' 10'' to 225' 11''
24.	COAL. Dip 26° N.,		3' 10'' to 438' 4''	1' 3'' to 227' 2'
25.	Slate, ...		20' 5'' to 458' 9''	8' 11'' to 236' 1''
26.	Sandstone, ...		14' 8'' to 473' 5''	6' 5'' to 242' 6''
27.	Slate, ...		47' 8'' to 521' 1''	20' 10'' to 263' 4''
28.	Sandstone, ...		35' 0'' to 556' 1''	15' 4'' to 278' 8''
29.	Fine conglomerate,		45' 0'' to 601' 1''	21' 2'' to 299' 10''
30.	COAL. Dip 28° N., .		2' 4'' to 603' 5''	1' 9'' to 301' 7''
31.	Slate, ...		8' 0'' to 611' 5''	3' 9'' to 305' 4''
32.	Sandstone, ...		40' 8'' to 652' 1''	19' 2'' to 324' 6''
33.	Fine conglomerate,		39' 11'' to 692' 0''	18' 9'' to 343' 3''
34.	Sandstone, ...		63' 9'' to 755' 9''	29' 10'' to 373' 1''
35.	Slate, ...		2' 8'' to 758' 5''	1' 4'' to 374' 5''
36.	COAL. Dip 29°.	BUCK MTN. BED.	11' 0'' to 769' 5''	5' 4'' to 379' 9''
37.	Slate, ...		32' 10'' to 802' 3''	15' 4'' to 395' 1''
38.	COAL. Dip 27°.		16' 11'' to 819' 2''	7' 8'' to 402' 9''

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Part II.

East Mahanoy Railroad tunnel.
Phila. and Reading R. R. Co.

No. of strata.	*Description.*		*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
1.	Conglomerate,		52′ 0″ to 52′ 0″	16′ 11″ to 16′ 11″
2.	Sandstone, . .		39′ 0″ to 91′ 0″	12′ 8″ to 29′ 7″
3.	SS. Dip 19°, .		99′ 0″ to 190′ 0″	32′ 2″ to 61′ 9″
4.	Coarse SS., . .		65′ 0″ to 255′ 0″	21′ 2″ to 82′ 11″
5.	COAL AND SLATE, .	MAMMOTH BED.	27′ 0″ to 282′ 0″	8′ 0″ to 90′ 11″
6.	Slate, . .		8′ 0″ to 290′ 0″	2′ 10″ to 93′ 9″
7.	Shelly SS.,		15′ 0″ to 305′ 0″	5′ 0″ to 98′ 9″
8.	COAL, . .		27′ 0″ to 332′ 0″	8′ 0″ to 106′ 9″
9.	Blue slate, . .		13′ 0″ to 345′ 0″	4′ 11″ to 111′ 8″
10.	Pea and mustard cong.,		45′ 0″ to 390′ 0″	16′ 11″ to 128′ 7″
11.	SS. full of quartz veins,		33′ 0″ to 423′ 0″	12 11″ to 141′ 6″
12.	SS. and cong.,		8′ 7″ to 431′ 7″	3′ 4″ to 144′ 10″
13.	SKIDMORE BED, ...		6′ 5″ to 438′ 0″	2′ 6″ to 147′ 4″
14.	Slate, ...		4′ 0″ to 442′ 0″	1′ 7″ to 148′ 11″
15.	Sandstone, . .		29′ 10″ to 471′ 10″	11′ 7″ to 160′ 6″
16.	Slate, ...		5′ 2″ to 477′ 0″	2′ 0″ to 162′ 6″
17.	Hard massive sandstone, .		45′ 0″ to 522′ 0″	18′ 4″ to 180′ 10″
18.	Dark slate, . .		13′ 6″ to 535′ 6″	5′ 6″ to 186′ 4″
19.	COAL, ...		2′ 6″ to 538′ 0″	1′ 0″ to 187′ 4″
20.	Soft slate, . .		18′ 0″ to 556′ 0″	7′ 4″ to 194′ 8″
21.	Hard sandy slate, ...		51′ 4″ to 607′ 4″	20 10″ to 215′ 6″
22.	COAL, ...		3′ 8″ to 611′ 0″	1′ 6″ to 217′ 0″
23.	Blue slate, . .		33′ 1″ to 644′ 1″	13′ 6″ to 230′ 6″
24.	Sandstone, . .		4′ 11″ to 649′ 0″	2′ 0″ to 232′ 6″
25.	Slate, ...		7′ 0″ to 656′ 0″	2′ 11″ to 235′ 5″
26.	Sandy shale, .		8′ 8″ to 664′ 8″	3′ 7″ to 239′ 0″
27.	Blue slate, . .		7′ 4″ to 672′ 0″	3′ 0″ to 242′ 9″
28.	Dark gray slaty sandstone, .		16′ 4″ to 688′ 4″	6′ 8″ to 248′ 8″
29.	Slate, ...		8″ to 689′ 0″	4″ to 249′ 0″
30.	Pea cong. with quartz seams,		72′ 5″ to 761′ 5″	30′ 7″ to 279′ 7″
31.	COAL, ...		3′ 7″ to 765′ 0′	1′ 4″ to 280′ 11″
32.	Dark bluish gray slate, .		39′ 0″ to 804′ 0″	14′ 5″ to 295′ 4″
33.	Sandstone, . .		10′ 0″ to 814′ 0″	3′ 7″ to 298′ 11″
34.	Hard cong., .		45′ 0″ to 859′ 0″	16′ 2″ to 315′ 1″
35.	Hard dark SS., massive bottom, slaty top, ...		65′ 6″ to 924′ 6″	23′ 7″ to 338′ 8″

No of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
36.	COAL, ...	11′ 0″ to 935′ 6″	4′ 0″ to 342′ 8″
37.	Slate, ...	12′ 6″ to 948′ 0″	4′ 6″ to 347′ 2″
38.	BUCK MOUNTAIN BED, .	25′ 0″ to 973′ 0″	10′ 11″ to 358′ 1″
39.	Bottom slate,	2′ 0″ to 975′ 0″	11″ to 359′ 0″
40.	Hickory and walnut cong. with occasional slate partings, . .	329′ 1″ to 1304′ 1″	143′ 6″ to 502′ 6″
41.	Hard SS., . .	22′ 11″ to 1327′ 0″	10′ 0″ to 512′ 6″
42.	Hickory-nut cong., . . .	250′ 0″ to 1577′ 0″	109′ 0″ to 621 6″
43.	Slate, ...	1′ 0″ to 1578′ 0″	6″ to 622′ 0″
44.	Hickory-nut cong., very ferruginous,	164′ 0″ to 1742′ 0″	79′ 7″ to 701′ 7″
45.	Pea and hickory-nut conglomerate, .	150′ 0″ to 1892′ 0″	70′ 10″ to 772′ 5″
46.	COAL, ...	6′ 0″ to 1898′ 0″	3′ 0″ to 775′ 5″
47.	Slate, ...	7′ 0″ to 1905′ 0″	3′ 6″ to 778′ 11″
48.	Hard massive dark gray micaceous SS.,	25′ 0″ to 1930′ 0″	12′ 6″ to 791′ 5″
49.	Conglomerate,	4′ 0″ to 1934′ 0″	2′ 0″ to 793′ 5″
50.	Hard massive micaceous SS. with a few pebbles, . .	35′ 0″ to 1969′ 0″	16′ 10″ to 810′ 3″
51.	Hickory-nut cong., . . .	23′ 0″ to 1992′ 0″	11′ 6″ to 821′ 9″
52.	Hard ferruginous gray sandstone, .	25′ 0″ to 2017′ 0″	13′ 1″ to 834′ 10″
53.	Pea cong. containing beds of massive coarse, loose SS. 2′ to 3′ thick, . . .	37′ 0″ to 2054′ 0″	19′ 5″ to 854′ 3″
54.	Gray SS., . .	9′ 6″ to 2063′ 6″	5′ 0″ to 859′ 3″
55.	Hickory-nut cong., . . .	37′ 11″ to 2101′ 5″	19′ 11″ to 879′ 2″
56.	Hard SS., . .	7′ 7″ to 2109′ 0″	4′ 0″ to 883′ 2″
57.	Hard massive egg cong., .	118′ 0″ to 2227′ 0″	61′ 11″ to 945′ 1″
58.	Greenish gray ferruginous and argillaceous shale,	38′ 0″ to 2265′ 0″	18′ 2″ to 963′ 3″

No. of strata.	*Description.*	*Thicknesses measured horizontally.*	*Thicknesses perpendicular to dip.*
59.	Hard massive ferruginous sandstone, .	21′ 0″ to 2286′ 0″	10′ 0″ to 973′ 3″
60.	Hard massive walnut conglomerate, .	23′ 0″ to 2309′ 0″	11′ 0″ to 984′ 3″
61.	Hard massive gray SS. with a few scattered pebbles, .	33′ 0″ to 2342′ 0″	16′ 1″ to 1000′ 4′
62.	Cong. with a few pebbles,	6′ 0″ to 2348′ 0″	2′ 11″ to 1003′ 3″
63.	Very hard massive egg and walnut cong.,	54 0″ to 2402′ 0″	27′ 6″ to 1030′ 9″
64.	Greenish gray ferruginous shale, . . .	37′ 0″ to 2439′ 0″	18′ 10″ to 1049′ 7″
65.	Shaly ferruginous gray sandstone, .	21′ 0″ to 2460′ 0″	10′ 8″ to 1060′ 3″
66.	Massive greenish gray SS.,	14′ 0″ to 2474′ 0″	7′ 1″ to 1067′ 4″
67.	Gray sandy shale, . . .	26′ 0″ to 2500′ 0″	13′ 0″ to 1080′ 4″
68.	Massive false-bedded red, green and gray argillaceous SS., .	50′ 0″ to 2550′ 0″	23′ 5″ to 1103′ 9″
69.	Mottled red, green and gray ferruginous SS., . .	6 0″ to 2556′ 0″	2′ 10″ to 1106′ 7″
70.	Gray ferruginous SS., . .	6′ 0″ to 2562′ 0″	2′ 10″ to 1109′ 5″
71.	Conglomerate,	16′ 0″ to 2578′ 0″	7′ 11″ to 1117′ 4″
72.	Mottled red and gray shaly SS., .	29′ 0″ to 2607′ 0″	13′ 7″ to 1130′ 11″
73.	Hard fine-grained greenish gray sandstone, .	50′ 0″ to 2657′ 0″	23′ 5″ to 1154′ 4″
74.	Hard gray conglomerate, .	65′ 0″ to 2722′ 0″	30′ 5″ to 1184′ 9′,
75.	Gray SS., . .	10′ 0″ to 2732′ 0″	4′ 8″ to 1189′ 5″
76.	Red shale, . .	33′ 0″ to 2765′ 0″	15′ 5″ to 1204′ 10″
77.	Red sandstone,	8′ 0″ to 2773′ 0″	3′ 7″ to 1208′ 5″
78.	Very coarse gray SS., . .	19′ 0″ to 2792′ 0″	8′ 11″ to 1217′ 4″

No. of strata.	Description.	Thicknesses measured horizontally.	Thicknesses perpendicular to dip.
79.	Gray SS., . .	3′ 7″ to 2795′ 7″	1′ 9″ to 1219′ 1″
80.	Red shaly SS.,	6′ 5″ to 2802′ 0″	3′ 0″ to 1222′ 1″
81.	Greenish and gray shaly slate, ...	19′ 0″ to 2821′ 0″	8′ 11″ to 1231′ 0″
82.	Argillaceous and shaly gray SS., .	15′ 0″ to 2836′ 0′	7′ 0″ to 1238′ 0″
83.	Hard gray sandstone, .	6′ 0″ to 2842′ 0″	2′ 10′ to 1240′ 10′
84.	Hard gray cong.,	5′ 0″ to 2847′ 0″	2′ 5″ to 1243′ 3′
85.	Gray SS., . . .	14′ 6″ to 2861′ 6′	6′ 10″ to 1250′ 1″
86.	Red shale, . .	8′ 6″ to 2870′ 0″	4′ 0′ to 1254′ 1″
87.	Red sandstone,	16′ 0″ to 2886′ 0″	7′ 6″ to 1261′ 7″
88.	Fine-grained gray SS., . .	34′ 0″ to 2920 0″	16′ 1″ to 1277′ 8′
89.	Cong. with SS. alternations,	5′ 0″ to 2925′ 0″	2′ 5″ to 1280′ 1″
90.	Gray cong. false bedded, . .	36′ 0″ to 2961′ 0″	17′ 7″ to 1297′ 8″
91.	Soft red shale,	24′ 11″ to 2985′ 11″	12′ 1″ to 1309′ 9″
92.	Red sandstone,	4′ 1″ to 2990′ 0″	2′ 0″ to 1311′ 9″
93.	Soft red shale,	44′ 2′ to 3034′ 2″	21′ 11″ to 1333′ 8″
94.	Red and gray mottled SS.,	15′ 10″ to 3050′ 0″	7′ 6″ to 1341′ 2″
95.	Soft red shale,	22′ 0″ to 3072′ 0″	10′ 2″ to 1351′ 4″
96.	Cong., greenish gray matrix,	61′ 0″ to 3133 0″	27′ 2″ to 1378 6″
97.	Soft red shale,	59′ 5″ to 3192′ 5″	24′ 7″ to 1403′ 1″
98.	Hard gray sandstone, .	9′ 7″ to 3202′ 0″	4′ 0″ to 1407′ 1″
99.	Hard mottled red and greenish gray shales, . . .	57′ 0″ to 3259′ 0″	23′ 8″ to 1430′ 9″
100.	Gray SS., . . .	8′ 0″ to 3267 0″	3′ 4″ to 1434′ 1″
101.	Fine-grained gray SS., . .	20′ 0″ to 3287′ 0″	8 4″ to 1442′ 5″
102.	Hard massive greenish gray arenaceous SS. containing a few scattered pebbles, . .	65′ 0″ to 3352′ 0″	22′ 8″ to 1465′ 1″
103.	Hard massive green SS., .	54′ 0″ to 3406′ 0″	18′ 0″ to 1485′ 1″
104.	Red shale, . .	46′ 0″ to 3452′ 0″	14′ 2″ to 1497′ 3″
105.	Green SS., . .	40′ 0″ to 3492′ 0″	12′ 5″ to 1509′ 8

See Columnar Section Sheet No. VII and Mine Sheet No. I, Atlas Western Middle Anthracite Field, Parts I and II.

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LIST OF

THE PUBLICATIONS

OF THE

GEOLOGICAL SURVEY OF PENNSYLVANIA.

FROM 1874 TO 1887.

ANNUAL REPORTS.

1885 **ANNUAL.** J. P. Lesley, State Geologist, 8°, 769 pp., with preface and index, accompanied by Atlas 8°, 8 pl., and maps, 1886, contains following special reports:

1. Oil and Gas. John F. Carll.
2. Vegetable Origin of Coal. Leo Lesquereux.
3. Pittsburg Coal Region. E. V. d'Invilliers.
4. Wellersburg Coal Basin. J. P. Lesley and E. B. Harden.
5. Tipton Run Coal Basin. C. A. Ashburner.
6. Anthracite Coal Region. C. A. Ashburner.
7. Wyoming Valley Fossils. C. A. Ashburner and A. Heilprin.
8. Bernice Coal Basin. C. A. Ashburner.
9. Mehoopany Coal Field. F. A. Hill.
10. Cornwall Ore Mines. J. P. Lesley and E. V. d'Invilliers.
11. Delaware and Chester Kaolins. J. P. Lesley and C. A. Ashburner.
12. Quaternary Geology, Wyoming Valley. C. A. Ashburner, F. A. Hill, and H. C. Lewis.
13. Pressure, &c., of Rock Gas. J. P. Lesley.
14. Progress Geodetic Survey. Mansfield Merriman.

1886 **ANNUAL.** J. P. Lesley, State Geologist, 8°, in four parts, as follows:

i. Pittsburg Coal Region.
ii. Oil and Gas Region.
iii. Anthracite Coal Region with Atlas.
iv. Miscellaneous Reports on Special Subjects.

IN PRESS.

MISCELLANEOUS REPORTS.

A. A history of the First Geological Survey of Pennsylvania, from 1836 to 1858, by J. P. Lesley. With the annual reports of the Board to the Legislature for 1874 and 1875. 8°, pp. 226, 1876.

B. Report on the Minerals of Pennsylvania, by F. A. Genth; and on the hydro-carbon compounds, by S. P. Sadtler. With a reference map of the State. 8°, pp. 206, 1875.

B2. Report on the Minerals, by F. A. Genth, continued from page 207 to 238. 8°, in paper cover, pp. 31, 1876. (Bound with B.)

M. Report of Chemical Analyses in 1874–5, in the Laboratory at Harrisburg, by A. S. McCreath. 8°, pp. 105, 1875.

M2. Report of Chemical Analyses in 1876–8, by A. S. McCreath; Classification of coals, by P. Frazer; Fire-brick tests, by F. Platt; Dolomitic limestone beds, by J. P. Lesley; Utilization of anthracite slack, by F. Platt; Determination of Carbon in iron or steel, by A. S. McCreath. With one folded plate (section at Harrisburg) and four page plates. 8°, pp. 438, 1879.

M3. Report of Chemical Analyses in 1879–80, by A. S. McCreath. With a reference map of 93 iron ore mines in the Cumberland Valley. 8°, pp. 126, 1881.

N. Report on the Levels above tide of railroads, canal and turnpike stations, mountain tops, &c., in and around Pennsylvania, in 200 tables, by C. Allen. With a map. 8°, pp. 279, 1878.

O. Catalogue of specimens collected by the survey, (No. 1 to No. 4,264,) by C. E. Hall. 8°, pp. 217, 1878.

O2. Catalogue (continued from No. 4,265 to No. 8,974); also catalogue of fossils, (pp. 231 to 239.) 8°, pp. 272, 1880.

P. Report on the Coal Flora of Pennsylvania and the United States, Vols. 1 and 2, (bound together,) by L. Lesquereux. 8°, pp. 694, 1880.

P. Report on the Coal Flora of Pennsylvania and the United States Vol. 3, with 24 double page plates (lithographed) of coal plants, to accompany P., Vols. 1 and 2. 8°, pp. 283, 1884.

(P.) Atlas of 87 double page plates (lithographed) of coal plants to accompany P., Vols. 1 and 2. 8°, 1879.

P2. Report on Permo-Carboniferous plants from W. Va. and Greene county, Pennsylvania, by W. M. Fontaine and I. C. White. With 38 double page plates (lithographed). 8°, pp. 143, 1880.

P3. Description of *Ceratiocaridæ*, by C. E. Beecher; and of *Eurypteridæ*, by James Hall. With 8 plates. 8°, pp. 39, 1884.

Z. Report on the Terminal Moraine across Pennsylvania, by H. C. Lewis; including extracts from descriptions of the Moraine in New Jersey, by G. H. Cook, and in Ohio, Kentucky and Indiana, by G. F. Wright. With a map of the State, 18 photographic views of the Moraine, and 32 page plate maps and sections. 8°, pp. lvi and 299, 1884.

Grand Atlas, Div. I, Pt. I, 1885, port-folio containing maps of 56 counties and parts of counties (scale 2 miles to 1 inch) on 49 sheets (26″×32″.) These maps are duplicate prints on heavy paper of the county maps contained in the reports of progress.

Annual Report, 1886. Part IV.

ANTHRACITE REGION.

A2. Report on the causes, kinds and amount of waste in mining anthracite, by F. Platt; with a chapter on methods of mining, by J. P. Wetherill·

Illustrated by 35 figures of mining operations, a plan of the Hammond breaker, and a specimen sheet of the maps of the Anthracite coal fields. 8°, pp. 134, 1881.

AC. Report on MINING METHODS, &c., in the anthracite coal fields, by H. M. Chance. Illustrated with 54 plates and 60 illustrations in the text. 8°, pp. 574, 1883.

(AC.) ATLAS containing 25 plates illustrating coal mining, to accompany Report AC, by H. M. Chance. 8°, 1883.

AA. First report of progress of the anthracite survey; PANTHER CREEK BASIN, by C. A. Ashburner; with a determination of the latitude and longitude of Wilkes-Barre and Pottsville, by C. L. Doolittle; and a theory of stadia measurements, by A. Winslow. 8°, pp. 407, 1883.

AA. Second report of progress of the anthracite survey, Part I; Statistics of Production and Shipment for 1883 and 1884. Charles A. Ashburner, geologist in charge.

(AA.) ATLAS OF SOUTHERN anthracite field, Part I, containing 13 sheets; 3 geological and mine sheets, 3 cross section sheets, 3 columnar section sheets, 1 topographical map sheet, and 1 coal bed area sheet, relating to the PANTHER CREEK BASIN; 1 general map of the anthracite region, and 1 chart of anthracite production from 1820 to 1881. 8°, 1882. Charles A. Ashburner, geologist in charge; A. W. Sheafer and Frank A. Hill, assistant geologists.

(AA.) ATLAS OF WESTERN MIDDLE anthracite field, Part I, containing 11 sheets; 4 geological and mine sheets between Delano and Locust Dale, 3 topographical sheets between Quakake Junction and Mount Carmel, and 4 cross section sheets. 8°, 1884. Charles A. Ashburner, geologist in charge; A. W. Sheafer and Bard Wells, assistant geologists.

(AA.) ATLAS OF WESTERN MIDDLE anthracite field, Part II, containing 11 sheets; 4 geological and mine sheets from Mount Carmel to the western end of the coal field, and 7 columnar section sheets covering the entire field. 8°, 1887. Frank A. Hill, geologist in charge; Bard Wells, assistant geologist.

(AA.) ATLAS OF NORTHERN anthracite field, Part I, containing 6 geological and mine sheets between Wilkes-Barre and Nanticoke, 3 cross section sheets and 4 columnar section sheets. 8°, 1885. Charles A. Ashburner, geologist in charge; Frank A. Hill, assistant geologist.

(AA.) ATLAS OF NORTHERN anthracite field, Part II. In Press.

(AA.) ATLAS EASTERN MIDDLE anthracite field, Part I, containing 8 sheets, 2 geological and mine sheets in the vicinity of Hazleton, Drifton and surrounding towns, 3 cross section sheets and 3 columnar section sheets. 8°, 1885. Charles A. Ashburner, geologist in charge; A. P. Berlin and Arthur Winslow, assistant geologists.

(AA.) ATLAS OF EASTERN MIDDLE anthracite field, Part II. In Press.

GRAND ATLAS, Div. II, Pt. I, 1884. Port-folio containing 26 sheets, (26"× 32"), as follows: 13 sheets Atlas Southern Anthracite Field, Part I, 11 sheets Atlas Western Middle Anthracite Field, Part I, 1 sheet photo views of plaster models in Western, Middle and Southern Fields, and 1 specimen sheet, Report A 2.

GRAND ATLAS, Div. II, Pt. II, 1885. Port-folio containing 22 sheets, (26"× 32"), as follows: 13 sheets Atlas Northern Anthracite Field, Part I, 8 sheets Atlas Eastern Middle Anthracite Field, Part I, and 1 sheet containing a preliminary general map of the Anthracite Coal Fields and adjoining counties.

For Anthracite coal in SULLIVAN county, see G 2 and Annual Report, 1885.

For Conglomerate beds near Carbondale, Pittston, &c., see G 5, G 7.

For Utilization of anthracite slack, see M 2.

For General description anthracite region, Quaternary Geology of the Wyoming-Lackawanna Valley, &c., &c., see Annual Report, 1885. Annual Report, 1886. Part III.

BITUMINOUS COAL FIELDS AND SURROUNDING AREAS.

H. First report on CLEARFIELD and JEFFERSON counties, by F. Platt. With 8 maps, 2 sections and 139 cuts in the text. 8°, pp. 296, 1875. (*For second report, see H 6, H 7.*)

H 2. Report on CAMBRIA county, by F. & W. G. Platt. With 4 maps and sections and 84 cuts in the text. 8°, pp. 194, 1877.

H 3. Report on SOMERSET county, by F. & W. G. Platt. With 6 maps and sections and 110 cuts in the text. 8°, pp. 348, 1877.

H 4. Report on INDIANA county, by W. G. Platt. With a colored geological county map and 87 cuts in the text. 8°, pp. 316, 1878.

H 5. Report on ARMSTRONG county, by W. G. Platt. With a colored geological county map and 58 cuts in the text. 8°, pp. 338, 1880.

H 6. Second report on JEFFERSON county, (*See H above*), by W. G. Platt. With a colored geological county map and 57 cuts in the text. 8°, pp. 218, 1881.

H 7. Second report on CLEARFIELD county, (*See H above*), by H. M. Chance. With a colored geological county map, an outcrop map of the Houtzdale basin and 58 cuts in the text. 8°, pp. 197, 1884.

I. Report on VENANGO county, by J. F. Carll. The geology around Warren, by F. A. Randall. Notes on the comparative geology of N. E. Ohio, N. W. Pa., and W. New York, by J. P. Lesley. With one small map of the Venango oil region, one small map of the region south and east of Lake Erie, one long section of the rocks at Warren, and 7 cuts in the text. 8°, pp. 127, 1875.

I 2. Report of oil well records and levels in VENANGO, WARREN, CRAWFORD, CLARION, ARMSTRONG, BUTLER, &c., by J. F. CARLL. 8°, pp. 398, 1877.

I 3. Report on the VENANGO, WARREN, CLARION, and BUTLER OIL REGIONS; descriptions of rig, tools, &c.; survey of the Garland and Panama conglomerates, &c.; discussion of pre-glacial and post-glacial drainage, by J. F. Carll. With 23 page plates and an atlas. 8°, pp. 482, 1880.

(I 3.) Atlas of 22 sheets. Map of Venango county, colored geologically; map of lower oil field (Butler, Armstrong, and Clarion) in two sheets; 3 local contour maps at Franklin, Titusville and Spring Creek; two maps of N. W. Pennsylvania, showing the past and present drainage; long section across W. Pennsylvania; vertical section of the formations from the Upper Coal measures down to the bottom of the Devonian; diagram map and section of Third sand; profile section from Meadville, S. W.; 5 sheets of grouped oil well sections; 5 sheets of working drawings for well boring, &c.; diagram of daily rate of drilling six wells at Petrolia.

I 4. Report on WARREN county, by J. F. Carll. With a colored geological county map, a map of the Warren oil region, and 2 sheets of oil well sections. 8°, pp. 439, 1883. (*Note—The first 147 pages of this book contain oil well records; see under Petroleum Fields below.*)

J. Report on the OIL REGION, by H. E. Wrigley; map and profile of line of levels through Butler, Armstrong, and Clarion, by D. J. Lucas; map and profile of Slippery Rock creek, by J. P. Lesley. 5 maps and sections, a plate and 5 cuts. 8°, pp. 122, 1875.

K. Report on GREENE and WASHINGTON counties, by J. J. Stevenson. With two county maps. (Showing the calculated local depths of the Pittsburgh and Waynesburg coal beds beneath the surface,) and 3 page plates of general sections. 8°, pp. 419, 1876. (*Note.—Since the publication of this book two colored geological county Maps have been published, and will be found in pocket of volume K 3 described below.*)

K 2. First report on FAYETTE, WESTMORELAND and S. E. ALLEGHENY counties, (*i. e.*, west of Chestnut Ridge,) by J. J. Stevenson. With 3 colored geological county maps and 50 cuts in the text. 8°, pp. 437, 1877.

K 3. Second report on FAYETTE and WESTMORELAND counties (the Ligonier Valley), by J. J. Stevenson. With 4 page plates and 107 cuts in text. 8°, pp. 331, 1878. (*Note.—In a pocket in this volume will be found the colored geological maps of Greene and Washington counties alluded to above.*)

K 4. Pt. I, Report on MONONGAHELA RIVER COAL MINES, from the West Virginia State Line to Pittsburgh, (including some on the Youghiogheny and other streams), by J. Sutton Wall. With a map of the region in a pocket, 12 heliotype pictures, and 26 page plates. 8°, pp. 231, 1884.

L. Report on the YOUGHIOGHENY coke manufacture, by F. Platt; Notes on the coal and iron ore beds, by C. A. Young; Report on methods of coking by J. Fulton, (*See G* below); Report on the use of natural gas in the iron manufacture, by J. B. Pearse and F. Platt; The Boyd's Hill gas well at Pittsburgh, by J. P. Lesley. With a map of the coke region, two folded plates of coke ovens, and page plates and cuts in the text. 8°, pp. 252, 1876.

Q. Report on BEAVER, N. W. ALLEGHENY and S. BUTLER counties by I. C. White. With 3 colored geological county maps, and 21 page plates of sections. 8°, pp. 337, 1878.

Q 2. Report on LAWRENCE county, and special Report on Correlation of the Pennsylvania and Ohio coal beds, by I. C. White. With a colored geological county map and 134 cuts in the text. 8°, pp. 336, 1879.

Q 3. Report on MERCER county, by I. C. White. With a colored geological county map and 119 cuts in the text. 8°, pp. 233, 1880.

Q 4. Report on CRAWFORD and ERIE counties, by I. C. White. With two colored geological county maps and 107 cuts in the text. Also, a Report on a pre-glacial outlet for Lake Erie, by J. W. Spencer. With two maps of the Lake region. 8°, pp. 406, 1881.

R. Report on McKEAN county, and its geological connections with Cameron, Elk, and Forest counties, by C. A. Ashburner. With 33 page plates of vertical and columnar sections, pictures of Rock city and Olean conglomerate, Wilcox and Kane spouting wells, map of Howard Hill coal field, &c., and an atlas of 8 sheets. 8°, pp. 371, 1880.

(R.) ATLAS for McKean county of 8 sheets:—Colored geological county map; three topographical maps; of Buffalo Coal Company tract, Alton coal basin, and Potato Creek coal basin: map of McKean oil district; one sheet of columnar sections between Bradford and Ridgway; and 2 diagram sheets of the Well account and Production account in the Bradford district.

R 2. Part II, report on township geology of CAMERON, ELK and FOREST counties, by C. A. Ashburner.

(R 2.) ATLAS for CAMERON, ELK and FOREST counties, of 11 sheets

(*Published November, 1884, in advance of the report*):—3 colored geological county maps; 1 anticlinal and synclinal map; 1 topographical map McKean county; 2 tract maps Forest and Elk counties; 1 map Straight Creek coal basin; 2 sheets oil well sections; and 1 sheet coal sections.

V. Report on N. BUTLER county; and (Part 2) special report on the Beaver and Shenango river coal measures, by H. M. Chance. With a colored geological map of N. Butler; a contour local map around Parker; a map of the anticlinal rolls in the 6th basin; a chart of the Beaver and Shenango rivers; profile section from Homewood to Sharon; Oil well records and surface sections; and 154 cuts in the text. 8°, pp. 248, 1879.

V 2. Report on CLARION county, by H. M. Chance. With a colored geological county map, a map of the anticlinals and oil-belt; a contoured map of the old river channel at Parker; 4 page plates, and 83 cuts in the text. 8°, pp. 232, 1880.

For the coal basins of BRADFORD and TIOGA counties, see report G.

For the coal basins of LYCOMING and SULLIVAN, see report G 2.

For the coal basins of POTTER county, see G 3.

For the coal basins of CLINTON county, see G 4.

For the coal in WAYNE county, see G 5.

For the East Broad Top coal basin in HUNTINGDON county, see F.

For the mountain coals in BLAIR county, see T.

For the Broad Top coal measures in BEDFORD and FULTON counties, see T 2.

For the coal basins in CENTRE county, see T 4.

For coal analyses, see M, M 2, M 3.

For classification of coals, see in M 2.

For coal plants, see P, P 2.

For fossil crustaceans in coal slate, see P 3.

For Origin of Coal; Pittsburgh Region and Monongahela Valley; Wellersburg coal basin, Somerset county; and Tipton Run coal-beds, Blair county; see Annual Report, 1885.

Grand Atlas Div. III, Pt. I, 1885, port-folio containing 35 sheets (26″×32″) as follows: 32 sheets relating to portions of the Petroleum and Bituminous Coal Fields, and three sheets relating to the Quaternary period.

Annual Report, 1886. Part I.

PETROLEUM AND GAS.

See reports I, I 2, I 3, I 4, and J, under Bituminous Coal Fields.

See L, for the Pittsburgh gas well, and the use of gas in the iron manufacture.

See Q, Q 2, Q 3, Q 4, for references to oil rocks in Beaver, Lawrence, Mercer, Crawford, Erie, and S. Butler counties.

See K for the Dunkard Creek oil wells of Greene county.

See R, R 2, for descriptions of oil rocks in McKean, Elk, and Forest counties.

See V, V 2, for notes on the oil rocks of N. Butler and Clarion counties.

See H 2 for oil boring at Cherry Tree, Cambria county.

See G 5 for oil boring in Wayne county.

See Annual Report, 1885, for report of progress in the oil and gas region, with special facts relating to the geology and physics of natural gas.

See Grand Atlas, Div. III, Pt. I, under Bituminous Coal Fields.

See Annual Report, 1886. Part II.

NORTH-EASTERN AND MIDDLE PENNSYLVANIA.

(*Palæozonic formations from the Coal Measures down.*)

D. First report on LEHIGH county iron mines, by F. Prime. With a contour line map of the ore region and 8 page plates. 8°, pp. 73, 1875.

D 2. Second report on LEHIGH county iron mines, by F. Prime. With a colored geological contour line map of the iron region, (in 4 sheets,) a colored geological contour line map of the Ironton mines, 4 double page lithograph pictures of Limestone quarries, and one page plate of *Monocraterion.* 8°, pp. 99, 1878.

D 3. Vol. I. Report on LEHIGH and NORTHAMPTON counties. Introduction by J. P. Lesley; Slate belt, by R. H. Sanders; Limestone belt and iron mines, by F. Prime; South mountain rocks, by F. Prime and C. E. Hall. With 3 lithograph pictures of quarries, 4 pictures of triangulation stations, 14 page plates of sections, and an atlas of maps. 8°, pp. 283, 1883. (*Note.—For atlas see below.*)

D 3. Vol. II, Part I. Report on BERKS county, (*South mountain belt*) by E. V. d'Invilliers. With 10 page plates of sections and Indian relics, and 3 pictures of rock exposures. 8°, pp. 441, 1883. (*Note.—For atlas see below.*

(D 3.) ATLAS: One colored geological map of *Lehigh* and Northampton counties, (*one sheet;*) one colored geological contour line map of Southern Northampton county, (*six sheets;*) a contour line map of the mountains from the Delaware to the Schuylkill, (*eighteen sheets;*) a colored geological contour line index map to the 22 sheets, (*one sheet;*) and 4 sheets of maps of iron mines.

(D 5.) ATLAS of colored geological county maps of CUMBERLAND, FRANKLIN, and ADAMS, (*three sheets;*) and first instalment of contour line map of the South mountains, Sheets A 1, A 2, B 1, B 2, (*four sheets;*) by A. E. Lehman.

F. Report on the JUNIATA RIVER district in MIFFLIN, SNYDER, and HUNTINGDON counties, by J. H. Dewees, and on the Aughwick valley and East Broad Top region in HUNTINGDON county, by C. A. Ashburner. With colored geological maps of East Broad Top R. R. and Orbisonia vicinity, (2 sheets;) Three Springs map and section, (2 sheets;) Sideling Hill Creek map and section, (2 sheets,) and Isometric projection at Three Springs, (1 sheet;) six folded cross sections and 22 page plates of local maps and columnar sections. 8°, pp. 305, 1878.

F 2. Report on PERRY county, (*Part 1, geology,*) by E. W. Claypole. With two colored geological maps of the county; 17 geological outline township maps as page plates, and 30 page plate cross and columnar sections. 8°, pp. 437, 1884.

G. Report on BRADFORD and TIOGA counties, by A Sherwood; report on their coal fields, (including forks of Pine creek in Potter county,) by F. Platt; report on the COKING of bituminous coal, by J. Fulton. (*See L above.*) With two colored geological county maps, 3 page plates, and 35 cuts in the text. 8°, pp. 271, 1878.

G 2. Report on LYCOMING and SULLIVAN counties; field notes by A. Sherwood; coal basins by F. Platt. With two colored geological county maps (of Lycoming and Sullivan,) a topographical map (in two sheets) of the Little Pine creek coal basin, and 24 page plates of columnar sections. 8°, pp. 268, 1880.

G 3. Report on POTTER county, by A. Sherwood. Report on its COAL

Fields, by F. Platt. With a colored geological county map, 2 folded plates and 2 page plates of sections. 8°, pp. 121, 1880.

G 4. Report on Clinton county, by H. M. Chance, including a description of the Renovo coal basin, by C. A. Ashburner, and notes on the Tangascootac coal basin, by F. Platt. With a colored geological county map, 1 sheet of sections, local Renovo map, 6 page plates, and 21 sections in the text. 8°, pp. 183, 1880.

G 5. Report on Susquehanna and Wayne counties by I. C. White. With a colored geological map of the two counties and 58 cuts in the text. 8°, pp. 243, 1881.

G 6. Report on Pike and Monroe counties, by I. C. White. With two colored geological county maps, (1 sheet Pike and Monroe and 1 sheet Wyoming), a map of glacial scratches, and 7 small sections. Report on the Delaware and Lehigh Water Gaps, with two contoured maps and five sections of the gaps, by H. M. Chance. 8°, pp. 407, 1882.

G 7. Report on Wyoming, Lackawanna, Luzerne, Columbia, Montour and Northumberland counties, (*i. e.*, the parts lying *outside* of the anthracite coal fields), by I. C. White. With a colored geological map of these counties (in two sheets), and 31 page plates in the text. 8°, pp. 464, 1883. (*Note.—The colored geological map of* Wyoming *county is published in G 6.*

T. Report on Blair county, by F. Platt. With 35 cuts in the text and an Atlas of maps and sections (see below). 8°, pp. 311, 1881.

(T.) Atlas of colored geological contour line map of Morrison's cove, Canoe valley, Sinking valley and country west to the Cambria county line (14 sheets); Index map of the same (1 sheet); colored sections (2 sheets). 8°, 1881.

T 2. Report on Bedford and Fulton counties, by J. J. Stevenson. With two colored geological maps of the two counties. 8°, pp. 382, 1882.

T 3. Report on Huntingdon county, by I. C. White. With a colored geological map of the county, and numerous sections. 8°, pp. 471, 1885.

T 4. Report on Centre county, by E. V. d'Invilliers; also special report, by A. L. Ewing, and extracts from report to Lyon, Shorb & Co., by J. P. Lesley. With a colored geological map of the county, 13 page plates of local maps and sections, and 15 cuts in the text. 8°, pp. 464, 1884.

For report on line of the Terminal Moraine, see Z.

Grand Atlas, Div. IV, Pt. I, 1885. Port-folio containing 43 sheets, as follows: 30 sheets relating to the Durham and Reading Hills and bordering valleys in Northampton, Lehigh, Bucks and Berks counties, and 13 sheets relating to the South Mountains in Adams, Franklin, Cumberland and York counties.

Grand Atlas, Div. V, Pt. I, 1885. Port-folio containing 35 sheets, as follows: 29 sheets relating to the Topography and Geology of the Palæozoic strata in parts of Cambria, Blair, Bedford, Huntingdon, Mifflin, Centre and Union counties, 5 sheets contain a map and geological cross section along the east bank of the Susquehanna river, Lancaster county, and 1 sheet contains cross sections of the Philadelphia belt of the Azoic rocks.

For report on Cornwall Iron Ore Mines, Lebanon county, and the Tipton Run coal beds, Blair county, see Annual Report, 1885.

SOUTH-EASTERN PENNSYLVANIA.

C. Report on York and Adams counties, by P. Frazer. With one folded map of a belt of York county through York and Hanover, 6 folded cross sections, and two page plate microscopic slices of dolerite. 8°, pp. 198, 1876.

(*Note.—The colored geological county map of* YORK *is published in the* ATLAS *to C 3*).

C 2. Report on YORK and ADAMS counties, (South Mountain rocks, iron ores, &c.), by P. Frazer. With one general map of the district, 10 folded cross sections, and 5 page plates. 8°, pp. 400, 1877. (*Note.—The colored geological county map of* ADAMS *is published in D 5*).

C 3. Report on LANCASTER county, by P. Frazer. With nine double page lithographic views of slate quarries and Indian-pictured rocks, one plate of impressions on slate, and one page plate microscopic section of trap, and an atlas. 8°, pp. 350, 1880.

(C 3.) ATLAS of 13 sheets: Colored geological map of York county; colored geological map of LANCASTER county; Susquehanna river section. (Sheets 1, 1A, 2, 2A, 3, 4); Lancaster section; Pequea section; Muddy run section; Chestnut Hill mines; Gap Nickel mine.

C 4. Report on CHESTER county; General description, pp. 214, by J. P. Lesley; Field notes in the townships, pp. 215–354, by P. Frazer. With a colored geological county map, a photographic view of contorted schists and 12 page plates. 8°, pp. 394, 1883.

C 5. Report on DELAWARE county, by C. E. Hall. With a colored geological county map; 30 photographic page plate views of granite quarries, kaolin pits, &c., and 4 page plates of altered mica. 8°, pp. 128, 1885. See Annual Report, 1885, for Kaolin report.

C 6. Report on PHILADELPHIA and the southern parts of MONTGOMERY and BUCKS counties, by C. E. Hall. With a colored geological map of the belt of country between Trenton and Delaware county (in 3 sheets), a sheet of colored cross sections and 24 cuts in the text. 8°, pp. 145, 1882.

(C 7.) ATLAS to report on Bucks and Montgomery counties, containing 12 sheets of topographical map of the Neshaminy, Tohickon and Perkiomen water basins by the Philadelphia Water Department on a scale of 1,600 feet to 1 inch, $\frac{1}{19200}$ of nature. 8°, 1887.—(Report C. 7. not ready for publication.)

E. Part I of (historical introduction to) a report on the AZOIC rocks, by T. S. Hunt. 8°, pp. 253, 1878.

For report on the kaolin deposits of CHESTER and DELAWARE counties, see Annual Report, 1885.

See also GRAND ATLAS, Div. V., Pt. I, under North-eastern and Middle Pennsylvania.

January 1, 1888.

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tlas to accompany Part 3, Annual Report of the Geological Survey of Pennsylvania for 1886.

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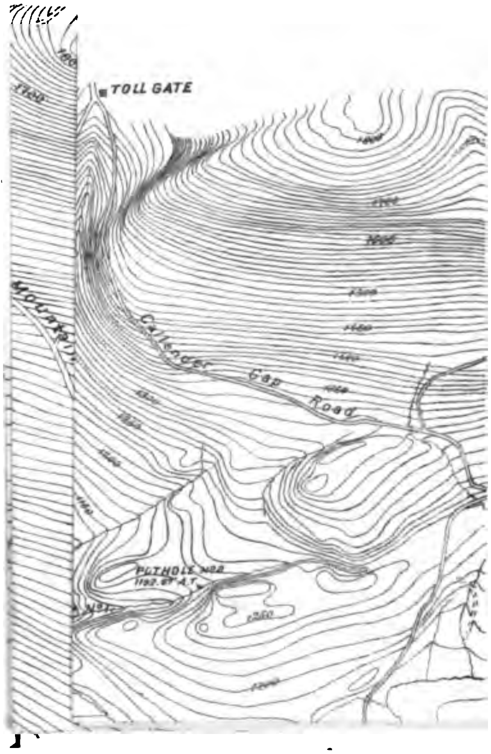

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